# School Shop

vol. X no. 4

DECEMBER, 1950

**Laboratory School Program**
by Lester C. Smith

**Make Close-up Slides Easily**
by Albert R. Walcott

**Add Upholstering to Your Program**
by Herbert Anderson

**Electricity Projects in Industrial Arts**
by T. Glade Wilcox

On the cover: Students at East Technical High School, Cleveland, Ohio, studying a problem in wood turning.

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# School Shop

FOR INDUSTRIAL EDUCATION TEACHERS


**CONTENTS** **Vol. X, No. 4** **DECEMBER, 1950**



**School Shop Talk**—Editorial Comment . . . . . 2
Labor "trouble" and the shop teacher.

**Laboratory School Program: from junior kindergarten to junior high.** Lester C. Smith . . . . . 9
The story of a unique program that involves all ages and both sexes.

**Would You Like to Make Close-up Slides Easily?** Albert R. Walcott . . . . . 11
A description of procedures for making lens extensions for cameras.

**Add Upholstering to the Program.** Herbert Anderson . . . . . 12
There are some new developments in this field that deserve your attention.

**Shop Organization Made Easy.** Arthur J. Halloran . . . . . 13
A description of a shop organization panel that is automatic in operation.

**Selection of Electricity Projects Is Important in Industrial Arts.** T. Glade Wilcox . . . . . 14
More meaning is needed in projects in electricity says this author who illustrates his viewpoint.

**New-Type Inlaid Checker Board.** D. C. Marshall . . . . . 15
An old project with a new twist that simplifies inlay work.

**Bonding Brake Lining.** H. B. Barrett . . . . . 16
A new development in the auto-mechanics field that deserves attention in school shops.

**TV Instruction Should Emphasize Installation.** Samuel L. Marshall . . . . . 17
Special skills are needed for TV installation work that should be taught in schools.

**Marbleized Projects Are Really "Keene."** Charles J. Varga . . . . . 18
Examples of projects involving casting.

**Jigsaw Jones.** Aaron Adams . . . . . 19
Following directions to the ultimate.

**News** . . . . . 20
Happenings of interest to shop teachers and administrators.

**In the Morning Mail** . . . . . 22
Comments about recent editorials and articles.

**Jigsaw Jones.** Aaron Adams . . . . . 24
Confidence, then consternation.

**Strictly Personal** . . . . . 24
About your fellow teachers.

**School Shop Kinks** . . . . . 26
Short cuts to more effective teaching.

**Make Mallets from Old Bats.** Frank L. Andrews . . . . . 28
Salvage those broken bats from the physical-education department for this well-designed project.

**Teach Machine Typesetting in High-School Shops?** Otto Reising . . . . . 30
A full discussion of the pros and cons of this question.

**Instructional Resources: Books, Pamphlets, Visual Aids** . . . . . 33
Listings of the latest in books, films, and other materials which will help you in your shop teaching. Designed to keep you up to date on instructional materials.

**News from Industry** . . . . . 36
News items about new products and teaching aids designed by industry to be of service to shop teachers. Send in a coupon today for free and low-cost materials.

**From Washington.** School Shop Washington Bureau . . . . . 40
News from the Nation's Capital of interest to shop teachers.

**Index to Advertisers** . . . . . 40



CCA

School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, 330 South State Street, Ann Arbor, Michigan. Subscription rates, $2.00 a year; Canadian, $2.00 a year; foreign, $3.00 a year. 50 cents a copy for the April issue. Orders 25 cents a copy. Printed in the U.S.A.


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# School Shop TALK

## COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

### Labor "Trouble" and the Shop Teacher

Even though news of labor "troubles" fills a good share of the space in our daily newspapers, such information is not read by high-school youth, a recent survey indicates. The study ("Labor-Management Relations and High-School Youth: A Survey of Communications Behavior") has been released by the University of Illinois Library School as one of its Occasional Papers. In it the author, Ralph E. McCoy of the University's Institute of Labor and Industrial Relations, indicates that teachers could do a great deal more to bring objective knowledge to their pupils about that very important area of modern life. Says McCoy, "The fact that the theme of labor-management relations does not contain the elements of love, adventure, or romance . . . should not be a deterrent to teachers, backed by librarians, in presenting the subject in an appealing manner." The reference to "love, adventure, and romance" came in connection with the author's citing the fact that these three items had been found in previous studies to rank highest in reading interest for high-school youth.

From a casual reading of the newspapers it might be gathered that the field of labor-management is always one of conflict, that strikes are the norm. That this is not so is readily apparent from a look at the available statistics or at newspapers and, more often, magazines which give broad coverage to labor events without undue emphasis on conflict. It has been estimated that 100,000 labor agreements are worked out annually, says Mr. McCoy, with only 3,000 to 5,000 stoppages of any sort. We think this is important information for young people to have. Since they tend to turn for their reading to "love, adventure, and romance," and since, again according to Mr. McCoy, one of three high-school students in the nation will in time join a union, we think that shop teachers should do their part to see to it that labor-management relations are presented in an objective fashion.

This doesn't mean that we introduce social-studies units in shop classes, nor that we should call in propagandists for any one side. What we can do, as the survey author pointed out, is to guide students to sources where they can get enough facts on which to base their judgments. We can alert them to the part that unions may play in their lives if they go into industry. We should explain the place of collective bargaining and the value of democracy in union organizations.

If we know anything, it is that among students shop teachers generally have as much respect or more than do other subject-matter teachers. For this reason, and because there is a more informal and casual atmosphere in shop sessions during which learning takes place and attitudes take shape, shop teachers should lean over backwards to be objective in whatever they do or say when questions of labor and management are concerned. —*W.P.B.*

### Next to Godliness

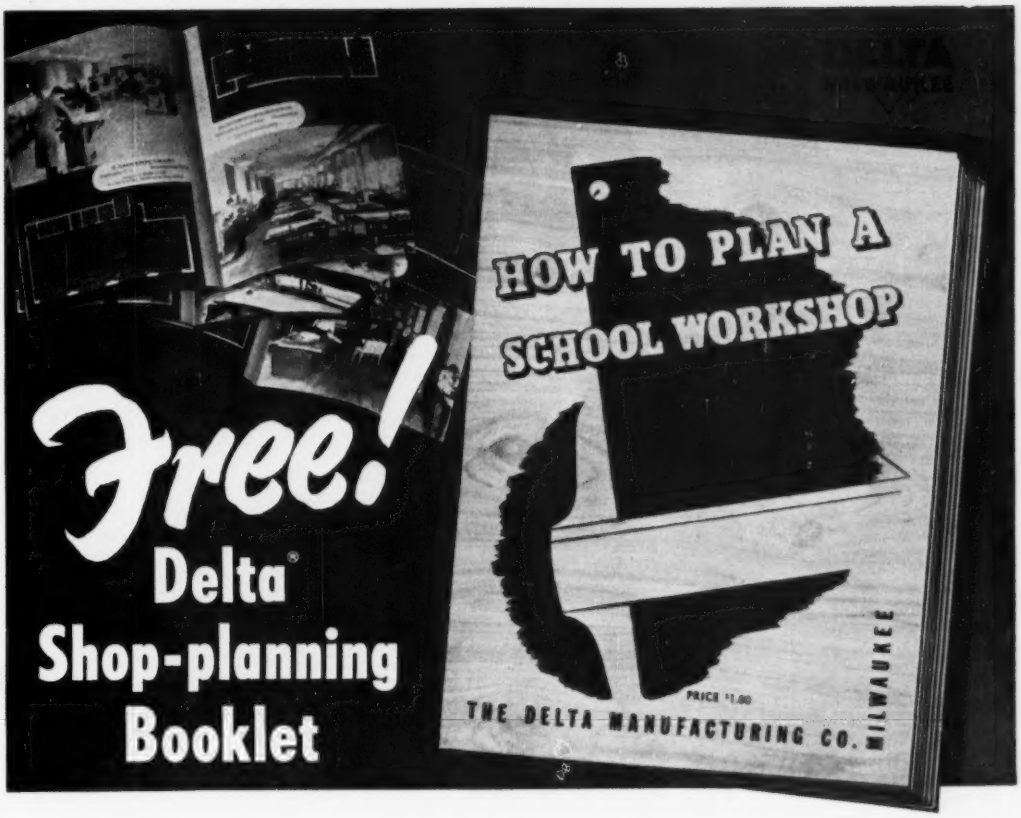
One of the lasting impressions that your peregrinating editor has of shops and shop facilities is the quality of the housekeeping and, specifically, the cleanliness and facilities of washrooms. All too frequently he has visited schools where the equipment in the shops was in first-class order, but the soap and other necessities in the washroom were nonexistent or were an untidy mess.

Unfortunately, he has had the same experience when visiting some industrial establishments.

The situation in schools is generally so bad that a clean, well furbished washroom seems to be more the exception than the rule. It is a real delight to visit the notable exceptions where there is plenty of soap of good quality, towels are adequate in quality and quantity, the washbasins are clean and sanitary, and the other facilities are neat and in good order.

If the school, as a public institution charged with the education of the young, does not provide the means for its charges to perform the simple, elementary practices of cleanliness in the proper way, its responsibility for developing good habits of health and housekeeping is not being discharged. Your editor has visited enough schools where this responsibility is being adequately filled to be skeptical of the common reasons given for failure to provide the proper facilities and for failure to maintain them adequately.

In good homes and in good business establishments the standards of most schools in this regard would not be tolerated.—*L.W.P.*

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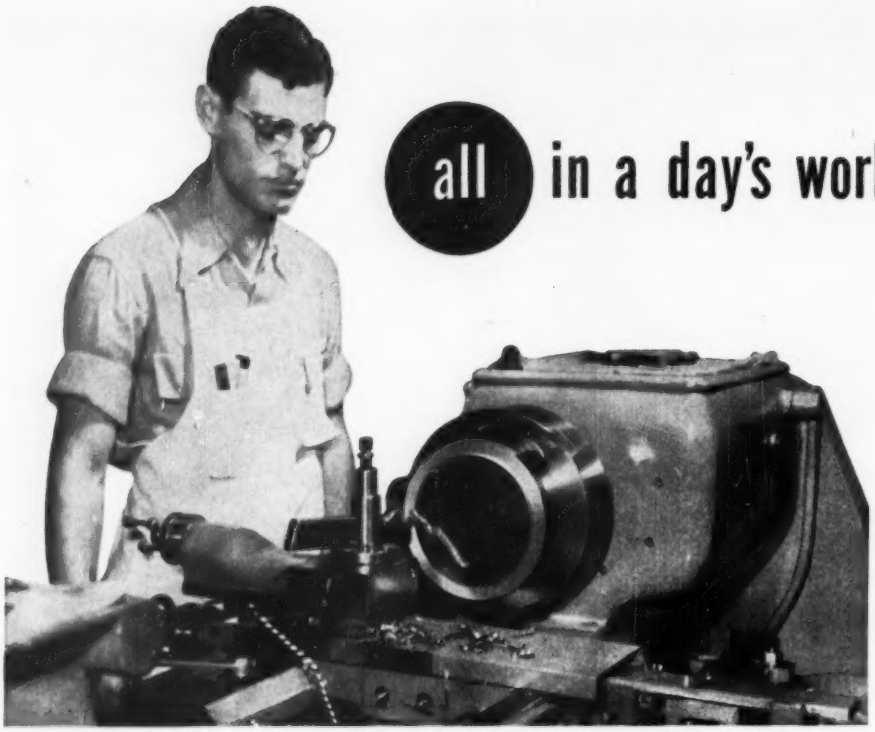

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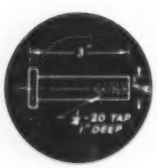
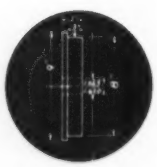
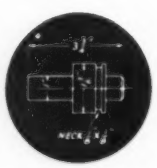



| material: | aluminum | |
|---|---|---|
| tools: | H.S.S. | |
| operation | speed | feed |
| face | 1200 | .015 |
| turn | 1200 | .018 |
| ctr. drill | 1200 | H |
| drill | 1200 | H |
| tap | 315 | H |



| material: | CMM 320 | |
|---|---|---|
| tools: | carbide | |
| operation | speed | feed |
| face | 608 | .018 |
| ctr. drill | 1200 | H |
| turn | 842 | .020 |
| neck | 315 | H |
| chamfer | 449 | H |

| material: | cast iron | |
|---|---|---|
| tools: | carbide | |
| operation | speed | feed |
| face | 842 | .015 |
| turn | 842 | .018 |
| ctr. drill | 842 | H |
| drill ⅜ | 608 | H |
| drill 1½ | 161 | H |
| co-bore | 842 | .015 |
| taper turn | 842 | .018 |



| material: | SAE 3150 | |
|---|---|---|
| tools: | H.S.S. | |
| operation | speed | feed |
| face | 82 | .013 |
| turn | 42 | .020 |
| ctr. drill | 608 | H |
| drill ⅜ | 608 | H |
| drill 1½ | 161 | H |
| bore | 315 | .020 |
| ream | 60 | H |

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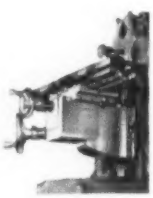

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# Laboratory School Program:
## from junior kindergarten to junior high

*By Lester C. Smith*

**The University of Chicago has made a name for itself as the scene of many departures from traditional educational practices. As might be expected, the Chicago Laboratory School is no exception to this rule. Here is the story of its unique 12-year program of industrial arts especially written for SCHOOL SHOP readers by the Director of the School.**

WITH the recent opening of a fully-equipped arts and crafts center for primary grades one and two, the Laboratory School of the University of Chicago realized its aim of providing a continuous arts and crafts program for 12 grades—junior kindergarten to junior high school.

This program has taken two major steps in its recent history which enabled the aim to come closer to realization. These were in 1928 and in the period 1938-40. In the first-named year a reorganization took place, a modern machine shop replaced some old and worn-out equipment, and a general shop, including power-driven machinery, was installed. At this time general shopwork was extended down to the sixth grade (this was later lowered to the fifth).

In the period of 1938-40, as a result of the reorganization of the College of the University of Chicago, grades 11 and 12 were taken out of the program of the Laboratory School. This gave a new impetus *and* more space with which to expand the shop program. Old shops underwent another remodeling. A unified arts program was developed, thus combining the work in general shop, art (including photography with a good darkroom), music, drama with stage settings, publications, and home arts. This is for seventh- and eighth-grade boys and girls and is offered in an advanced form as an elective in the ninth and tenth grades.

During this period a new shop was developed for grades three, four, five, and six. The offerings in this shop include woodwork, including wood turning, leather work, plastics, metal working, glass etching, working with cork, weaving, ceramics, home mechanics, and model making. Each pupil gets from one to three hours class work per week. In addition to basic handtools, we have such power-driven machinery as a wood lathe, sander, buffing wheels, jigsaw, planer, router, drill press, electric oven, bandsaw, and circular saw. We teach the youngsters the use of these machines when the job they are working on calls for it. Generally, third graders are permitted to use buffers, sanders, and jigsaws. By the end of the sixth grade, a pupil has learned to use carefully all power machinery. He operates the machines under the direct supervision of the instructor and he is taught the utility of each for industry. We feel that getting to know the intelligent use of power is advantageous for him. Machines are carefully guarded; in 10 years we have not had an accident on machinery in our shops.

The Laboratory School shop library has practically every book published in the areas our program is concerned with and, of course, we receive the professional magazines. A large file of clippings, plans, and drawings is also available and is put to good use by our pupils who are also encouraged to visit toy departments, gift stores, and exhibits for ideas. Complete records are kept for each pupil and we also keep notes on their progress. Parents receive reports on the state of their children's arts and crafts program twice a year.

Throughout the 12-year program, choice of work projects is elective. In the third grade, for example, we do not set any specific project requirements. Names of tools are learned and their proper use demonstrated. Each pupil works at his own pace and in his own way, but his mistakes are pointed out to him and more efficient methods are suggested for his work.

Whereas the third-grade program outlined above is wholly elective, there are some requirements in other grades. Pupils are free to elect which project they will construct within each area, but at least one project is required from each of the areas covered. In addition, a miscellaneous project calling for the use of two or more materials is required.

These determined youngsters have mastered whatever fears they may have once had concerning the use of heavy tools and power-driven machinery.

They start to use these tools in the early grades and are familiar with all tools and machinery in the shop by the end of the sixth grade.

The program in the Chicago Laboratory School stresses variety—youngsters work with many different materials and on a great number of machines during their 12 years of training.

## Workshop Planning

For pupils in the sixth grade we have instituted what we consider to be a very sound educational device. Each one is called on to make plans for a home workshop to cost in the neighborhood of $500, including tools. A full supply of catalogs is available and much interesting conversation such as the following can be heard:

*Mary:* Which is better, a ——— or a ——— saw?

*John:* Well, this catalog says only ——— makes "silver-steel saws" and that they last long after ordinary saws have been discarded.

*Mary:* ——— advertises the finest planes in the world. We have them in our shop so I know they are good.

*Sam:* I am going to get a ——— jigsaw.

*Carl:* I saw a ——— jigsaw being demonstrated. It had absolutely no vibration. A small square of wood was balanced on the saw table and it never fell over. It is also cheaper than the ———.

*Mary:* Here is one hammer for 95c and another for $2.50. I wonder if there really is much difference in the quality.

*Jane:* Do you need a ½ h. p. or a ¾ h. p. motor to run a bandsaw? What is the difference between a single-phase and a three-phase motor?

*Carl:* Here is a whole shop in one machine for $169.50. It is a sander, drill press, lathe, circular, saw, shaper, router, mortiser combination with a ½ h. p. motor.

*Mary:* I'm going to get a small hammer. I believe I could drive nails better with it and I wouldn't be hurt as much when I hit my finger.

*Sam:* Say! Did you ever try to drive an eight-penny nail with a tack hammer. It simply can't be done. I say, get an honest-to-goodness hammer and hold it right so you don't hit your finger. I was in the primary shop the other day and even those little kids use big tools just like we do.

*Jane:* I have used my whole $500 and haven't even bought a hammer. Oh, my! what will I have to cut out?

This shop-planning scheme furnishes a lot of education concerning a variety of tools, their uses and costs. Pupils will take pride in good tools and the realization of their cost will make them more careful in using these tools. Several pupils have been given money by their parents in order to carry out their plans for home workshops drawn up in the Laboratory School.

Because of the elective nature of the classes in grades four, five, and six, each pupil makes a work plan for his year's work. Changes may be made in these plans as need arises. A typical plan for a fifth-grade girl might include two projects each in the following areas: leather, plastics, metalworking, woodworking, weaving, wood-turning, and two projects of a miscellaneous nature, such as etching glass or making cork mats.

## Primary Arts and Crafts

The newest unit, our primary arts and crafts center, is located in a large sunny room adjacent to the middle-grades shop. An art teacher and a shop teacher are in charge of a group averaging 25 in number. At one end of the room there are four woodworking benches, each of which has four vises and is made with special 24" and 26" tops. A large tool panel mounted on a cabinet partially cuts off the shop section from the section devoted to arts. This section has tables and chairs made to order for tiny craftsmen. They lay paper on the floor whenever large drawings or tracings have to be made. Whenever any power-tool work must be done for this age group, the instructor takes the work into the middle-grade shop.

There are about 150 primary-grade children. Each has two one-hour periods in the center per week. The combined program enables us to integrate art and shop work in, for example, making kites where the youngsters bring their skills in art and in shop work to bear on a single project. Processes are taught to groups but, once the operations are mastered, pupils are on their own and each can work at his own pace.

Junior and senior kindergarteners each have their own workrooms. Benches and tools remain in the rooms and work is under the supervision of the homeroom teacher. Individual and group projects are made, chiefly from wood, cardboard, and paper. They construct play-house furniture and each spring they construct a model village from orange crates, etc.

There is a great amount of correlation with other subject-matter areas, especially science and social studies. They make objects based on their study of history, other cultures, and of such units as transportation, sound, gravity, etc.

Pupils in the shop program at the Laboratory School work closely with other departments. For instance, dramatics or assembly programs offer such projects as costumes, lighting, etc. Christmas-season activities present the opportunity to make and repair toys for distribution through charitable organizations.

Public-relations aspects of the shop program are not neglected. We open the shops to parents and older children one evening each week. Graduate students also use the shops for spare-time projects. Large display cases are being installed in the corridors and halls near the shops. Pupils will arrange their own exhibits with an eye to interesting both teacher and parent.

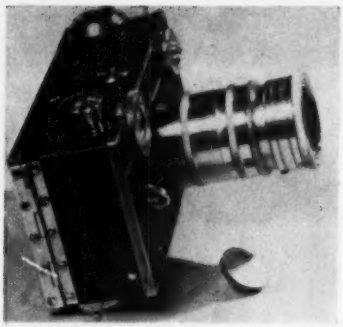
At Chicago we feel that the greatest value of a shop program lies in the help

(*Continued on page 32*)

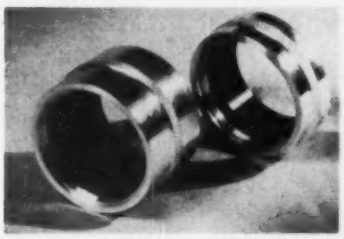
# Would You Like to Make Close-up Slides Easily?

*By Albert R. Walcott*

**These lens extensions, which can be made in the school machine shop, simplify the making of close-up slides—a useful teaching aid. Albert R. Walcott teaches at the American Institute of Specialized Watch Repair, Grand Rapids, Michigan.**



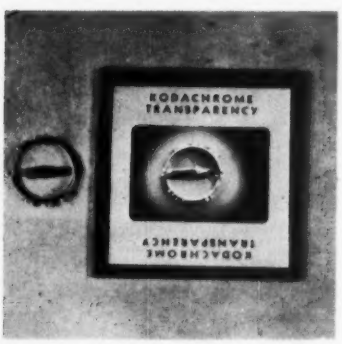
The lens extensions in position on the camera.



Note that the interior is coated with black.

IF YOU have ever tried to photograph or make slides of very small objects for use in the school shop, you undoubtedly found that it is a very difficult job. With a simple lens extension or extensions, as shown in the photographs, this becomes relatively easy.

Lens extensions can be made for any camera which has the lens barrel screwed into the camera case. (For modifying a camera having a bellows, see an article in the June, 1950 issue of *Science and Mechanics* magazine.)




The object and the picture are the same size.

The camera used here is a 35mm Argus, model C-3. Because our school does not have a machine shop, the two extensions of ½" and 1" were made for me by a machinist at a cost of $10. Later I had him make a ¼" extension which is useful in photographing very small objects such as the watch screw shown in the photograph. The picture of the head of the camel on a pack of cigarettes illustrates what can be done when all three extensions are utilized.

By using these extensions singly or in combination with the barrel turned in or out, several different lengths of extensions are made possible (see the accompanying chart). An extension of 1½" permits a ratio of almost 1 to 1 between object size and image size on the negative. A balance wheel ⅝" in diameter from a watch was photographed on Kodachrome film. The illustration shows the slide with the actual balance wheel beside it.

Many teachers will immediately see the value of this simple method of photographing and making slides of small objects. The possibilities of increasing the number of visual aids available in teaching are unlimited. In the course I teach, watch repairing, it is impossible for the student and the instructor to see the same thing at the same time in a watch. I can now make slides and show an entire class conditions in a watch or a very small part of a watch. I have bound the slides between glass and now have a permanent file of illustrations, charts, drawings, etc., which otherwise would have a very limited life.

Proper lengths for the various extensions were made on a trial-and-error basis as follows: A piece of ground glass was placed in the film track in the back of the camera. A piece of 8½"x11" white paper with ruled horizontal and vertical lines ½" apart was placed in front of the camera. A cardboard tube was placed between the lens barrel and the camera and an object on the paper was observed in the ground glass. The size of the field and the size of the object in the ground glass were thus obtained roughly for different lens extensions.

With this data, the machinist was able to construct the extensions with proper threading to fit the lens barrel and the camera. Incidentally, I have also made a ⅜" extension for my 8mm movie camera for close-up work.

Two kinds of film have been used in making slides. Type *A* Kodachrome has been used for color work while Panatomic film has been used for black and white. Positive prints were made by a local camera shop from the black-and-white negative. An exposure meter can be used to aid in getting the proper shutter speed and lens aperture.

**Table for Focusing and Field**

| *Extension* | *Distance to camera front* | *Area covered* |
|---|---|---|
| ¼ | 18½ ± ½ | 6 x 10 |
| ¼ + 3/16 | 12¼ ± ½ | 4 x 6 |
| ½ | 10⅜ ± ⅜ | 3 x 5 |
| ½ (out) | 8¾ ± ¼ | 2½ x 4 |
| 1 | 7¼ ± ⅛ | 1½ x 2½ |
| 1 (out) | 6⅞ ± 3/32 | 1¼ x 1¾ |
| 1½ | 6½ ± 1/16 | 1 x 1¼ |
| 1½ (out) | 6⅜ ± 1/16 | ¾ x ¾ |
| 1¾ + 3/16 | 6¼ ± 1/16 | ½ x ½ |

Note: In column 1, "out" means that the barrel is turned out to give a longer extension.

In column 2, the figures after "±" indicate depth of focus.

In column 3, corners are cut off on all negatives when the 1", 1½", and 1¾" extensions are used.

Small objects can be enlarged tremendously by the use of all three lens extensions.

# Add Upholstering to the Program

*By Herbert Anderson*

**Here is a neglected area of industrial arts that should have more attention paid to it by woodworking and general-shop teachers. Herbert Anderson teaches woodworking at The Stout Institute, Menomonie, Wisconsin.**

IT is sad but true that upholstering is a much overlooked area of industrial-arts activities in our secondary schools. This is difficult to understand, in view of the tremendous value it can have for consumer education. A knowledge of upholstery will make young people exercise greater care in furniture purchasing when they become adults and it will aid them to rehabilitate and repair furniture in their home workshops.

The failure to adopt upholstering units in school-shop programs may be due to the shortage of trained teachers or to the widespread belief that large and cumbersome objects must be constructed in any upholstering activity. A good woodworking or general-shop teacher can instruct in upholstering and there is no need to make large, cumbersome objects.

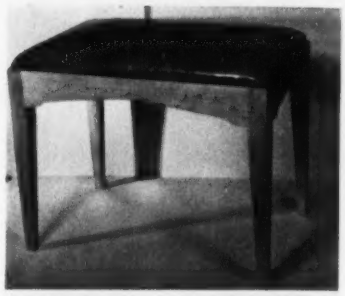
I believe all general woodworking courses can be enriched by the addition of upholstery as an essential area of work. Shop programs organized on the unit basis might well consider offering a course called upholstering and make it available for boys and girls alike.

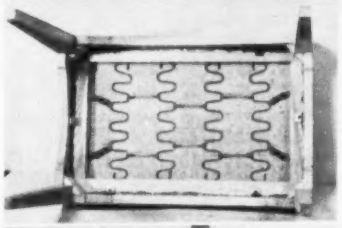
Below are outlined some basic operations which might serve as a starter in a course in upholstering. At Stout Institute we have developed a very effective teaching aid for use in such classes. Figures 3 and 4 are shots of the same frame; cutaway sections are mounted on each side in order to illustrate two different procedures.

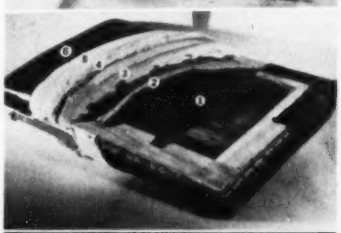
The arch spring, which is being installed in much of our upholstered furniture today, makes possible a simple but effective spring installation. The spring assembly may be installed in a short period of time by beginners for a minimum cost. The vanity bench illustrated in figure 1 was upholstered on an arch-spring assembly. The underside of the same bench, figure 2, shows the simple but effective spring installation. The arch-spring stock is purchased in coils of approximately 120 feet. The length of spring, in accordance with the span of the frame and amount of arch, is cut from the coil. Various gages of spring stock may be secured; the selection of gage is determined by the weight to be supported and the length of span. The spring shown in figure 2 is gage 9. Gage 11 is recommended for back rest assembly. The arch springs are attached to the frames with metal clips and are properly spaced to receive the wire links. Small helical springs are installed at the ends of the assembly. It is apparent from figure 2 that the wire links and small helical springs serve to keep the spring assembly intact and to permit uniform cushioning. In poorer grades of furniture the wire links and helical springs are omitted; furthermore, the arch springs are often spaced too far apart to provide a comfortable support.

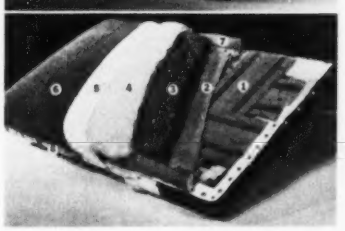
The use of arch springs in furniture eliminates the need for webbing. A layer of burlap is tacked over the spring installation. Then filler materials which are to be placed over the burlap are selected. Cost may be one of the factors to consider when selecting filler material. Figure 3 illustrates a cutaway seat with foam rubber as the principal filler material. Foam rubber is perhaps the most costly, but also the most resilient filler material. It retains its original shape for many years. Foam rubber is attached to a wood frame by cementing one-half the width of a 3" strip of muslin to the top surface around the arris of the foam rubber. The muslin is then tacked to the frame. As illustrated in figure 3, a layer of cotton is placed over the foam rubber, followed by a muslin cover and finally the plastic cover material is tacked in place.

Figure 4 illustrates another type of upholstery procedure which involves materials of less cost. Begin by interlacing, stretching, and tacking webbing to the frame. The next step will be to tack a rolled edge around the frame which serves to hold the filler material in place, and to provide a firm edge to the seat. A burlap cover is then tacked within the rolled edge. The principal filler material is rubberized hair which may be secured in sheets, 1" to 4" thick, 2' wide and 6' long. From these sheets of rubberized hair a pad is cut that will fit within the rolled edge. A layer of cotton is placed over the rubberized hair, followed by a muslin cover, and finally the fabric cover is tacked in place. Upholstered seats of this type may be trimmed with welt cord, metaline tacks, or gimp.









From the top: An example of arch-spring assembly, a covered vanity bench.

Underside of the same bench showing simple spring installation.

Cutaway teaching-aid frame showing layers of covering: 1, arch spring; 2, burlap; 3, foam rubber; 4, cotton; 5, muslin; 6, plastic cover.

Cutaway of reverse side of teaching-aid frame; layers consist of: 1, webbing; 2, burlap; 3, rubberized hair; 4, cotton; 5, muslin; 6, fabric cover; 7, rolled edge; 8, gimp or edging.

# Shop Organization Made Easy

*By Arthur J. Halloran*

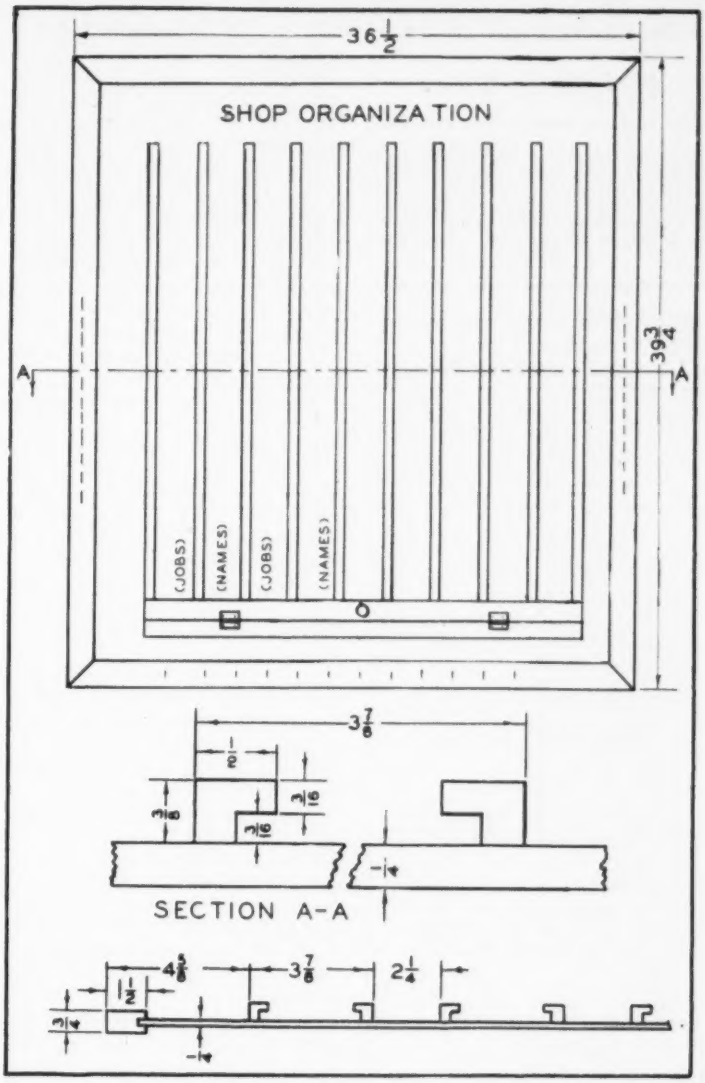
**This shop organization device has the blessings of simplicity and automatic operation. Arthur J. Halloran teaches machine shop at the Wayne, Michigan, High School.**

INSTRUCTION in industrial arts cannot achieve all of its objectives if some attention is not given to emphasizing the importance of good organization in any activity involving the cooperation of a number of individuals as in a school shop.

Careful planning and organization are necessary, moreover, if all pupils are to gain the breadth of experience which comes from participation in the various activities found in the modern school shop.

The shop organization device described here has been designed to help achieve the foregoing objectives. As can be seen from the illustration, the device is a large board with parallel columns for each class section. The names of students are typed on strips of paper which fit between the rails on each side of the column marked for "names." Various jobs in the shop organization outline are each specified and typed on slips of paper which are fastened to blocks of wood and mounted in the column for "jobs."

Student removing tool check opposite his name on the shop organization board. Note aprons.




Each class elects a shop foreman, a shop secretary, and a safety foreman. The other jobs are rotated among the remaining students. These three officers can be changed frequently during the semester, of course.

On entering the class the student finds his name in the "name" column and performs the activity designated on the block in the next column of "jobs." The blocks are alternated weekly so that the responsibility of the students changes. This task is performed by the foreman.

At the close of the class period the student finishes up his job assignment so that the shop will be clear for the next class.

The shop organization device has the merit of operating automatically with every student aware of his responsibilities with the shop foreman, as an elected student representative, to check and supervise. Attendance can be checked with it as can tools, by placing the check number opposite the student's name.

The device is constructed of plywood and may be any size, depending on the individual teaching situation. The blocks are held in place in their column by a hinged flap enclosure.

# Selection of Electricity Projects Is Important in Industrial Arts

**By T. Glade Wilcox**

**Neither toys nor gadgets can serve as suitable material for an industrial-arts program which includes a unit on electricity. What is needed are meaningful projects, says the author, who is Associate Professor of Industrial Education in the A. and M. College of Texas, College Station.**

INDUSTRIAL-arts electricity is becoming more popular in our schools with the increase in project possibilities. At the same time electricity that is not planned for the industrial-arts program cannot be expected to be successful. The nature of electricity is such that it needs to be integrated in our industrial-arts program as to subject-matter content, presentation, and projects.

For a successful electricity course for the industrial-arts program the following criterions are essential.

A. All content should be planned for covering a large scope (based on the exploratory and guidance objectives of industrial arts). Emphasis on learning engineering formulas and master-craftsmen skills to the advantage of covering a large area of content is detrimental.

B. Projects must become vehicles to learning or exploration; as such they become meaningful if they are real. Toys and gadgets or other forms of contrived experiences, experiments, and purposeless wiring jobs (purposeless in that the students does not have something of an intrinsic worth to take home) are not only meaningless in industrial arts but become parasitic to the course.

C. Consumer information and avocational possibilities need to be stressed. As an industrial-arts course, technical information of the kind found in electricity is of lesser importance than consumer information, in other words, the limit to technical information is determined by what the student will need as a prospective consumer. Another limiting factor to the quantity and quality of technical information is that needed by the hobbyist.

D. The consideration of electricity as a hobby necessitates the inclusion of radio in the course content. To be exploratory, we must include all of the aspects of electricity, and radio is one of those aspects.

Organizing electricity for industrial arts then becomes the arrangement of content in simple and progressive related information units with projects in the early units including basic operations and related information and those in the advanced units requiring more advanced—and less frequently used operations.

The resulting units of study and suggested projects then become:

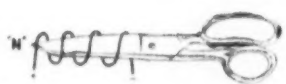
*Unit I.* Magnets and electric charges exert force in space. *Suggested projects:* (The approved method of teaching would have the student select and complete one project in each unit through the course to relate to the technical information and basic skills. Having completed the project in each unit, the student could return and complete another project as he desired.) Magnetic wristband, magnetized scissors, magnetized hammer, magnetic knife-holder, magnetic ashtray for car and magnetic tray for car. *Projects not meeting the criterions:* Compass, dip needle, etc., which necessitate improvised bearings and are thus not effective, real, or purposeful.

*Unit II.* Electricity as a result of chemical action and chemical actions as a result of electricity. *Suggested projects:* Assembly of Burgess Dry Cell (provided by Burgess Battery Company in kit form), rebuilding a storage battery, electroplating art-metal projects and suitable projects from other fields. *Projects not meeting the criterions:* Fruit-jar and jelly-glass primary cells that are not real in that they will not work in place of manufactured products.

*Unit III.* How a steady current flows. *Suggested projects:* Make a Burgess battery from the Burgess cells, extension cord, test lamp, rewire series Christmas tree lamps to parallel lights, and put turning lights on the car, motor scooter or a trailer. *Contrived experiences not meeting the criterions:* Wiring series and parallel circuits, door bells, buzzers, and all experiments such as current-flow and

(*Continued on page* 15)

## MAGNETIC SCISSORS




Problem:

To magnetize a pair of scissors so that the point has a magnetic "N" pole.

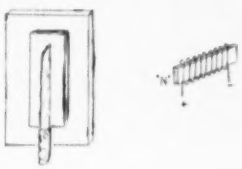
Materials:

1. Scissors.
2. No. 14 gage wire.
3. 6 volt battery.
4. Compass.

Procedure:

1. Coil wire around blades as shown in drawing.
2. Connect the ends of the wire (as marked in the drawing) to like poles on the battery.
3. When the wire becomes warm, disconnect it from the battery.
4. Remove the wire from the scissors.
5. Check the point with a compass.
6. Check for strength.
7. Get instructor's O.K.

## KNIFE HOLDER




Problem:

To magnetize a piece of magnetic alloy.

Materials:

1. A piece of magnetic alloy.
2. A block of wood.
3. No. 14 gage wire.
4. 6 volt battery.
5. Compass.

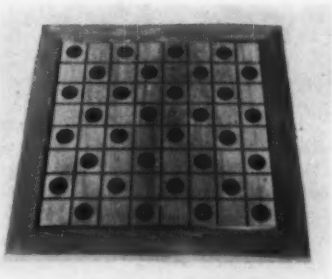
Procedure:

1. Grind or file a smooth surface on the steel.
2. Wrap the wire around the steel as shown in the drawing.
3. Using the right hand rule, connect the ends of the wire to the battery.
4. Remove the wire when it becomes warm.
5. Check the piece with a compass.

# New-Type Inlaid Checker Board

## *By D. C. Marshall*

**The attractiveness of the inlaid checker board is achieved with this project without requiring the high degree of skill usually associated with inlay work. D. C. Marshall teaches industrial arts in the Manhattan, Kansas, High School.**



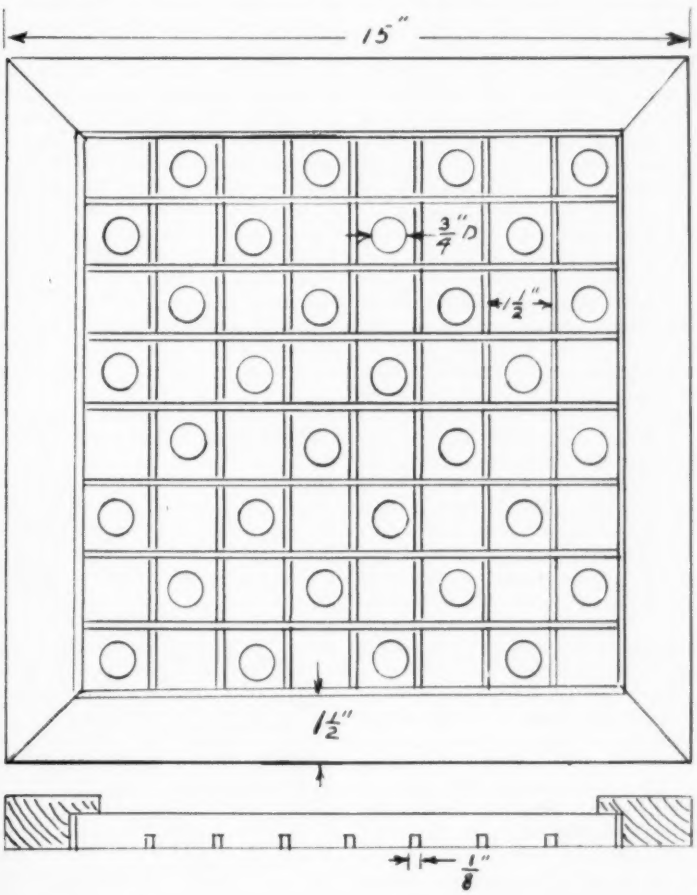
Dowels are used for this simple inlay job.

AN inlaid checker board that is different from the conventional type, and one that the less skilled student can make has the squares laid out by strips and the playing squares indicated by dowel inlays.

The playing board is made out of any desired kind of wood and the squares are outlined by cutting grooves ⅛" wide each way. The grooves are then inlaid with contrasting colored wood strips. The centers of the playing squares are carefully located and holes are bored ¼" deep and ¾" in diameter in the center of each. If a dowel of the desired wood is not available, one may be turned on the lathe. The sections are cut and glued in the holes and then the surface is sanded down.

A ¼" band is glued around the edges of the board. This band is of the same wood as the inlay strips. A frame for mounting the board is made of any desired wood. The corners are mitered and the inner edges are rabbeted to receive the playing board. This frame is fastened to the board by small screws set in the under side. Bumper tacks on the corners will protect the table top when the board is in use.

After the board has been sanded, two coats of clear lacquer, rubbed down, will give a finish that will stand hard use and will not be easily affected by liquids that may be spilled on it.

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**Electricity** . . . . . *from page* 14

voltage-drop types. These activities are suitable for electricity for vocational education or for a science course but not for industrial arts. An experiment is useful only when used as a part of a unit preceding the project to assist the student in the construction of the project.

*Unit IV.* How alternating current flows in circuits. *Suggested projects:* Trace and locate trouble in household appliances, rectifier power supply, crystal detectors, and simple repair of electrical appliances. *Projects not meeting the criterions:* Rheostat, toy synchronous motor, earphones, and other projects which cannot operate in place of the real thing or which are contrived experiences.

*Unit V.* Transfer of electrical power. *Suggested projects:* Door chimes, electric irons, transformers, and vibrators for marking tools so long as laminated silicon steel is used in the construction of the field magnet. Rewinding motors and the winding of a General Electric ¼ h.p. motor or generator kit meet the criterions. *Projects not meeting the criterions:* Toy motors, bells, telegraph keys, and sounders.

*Unit VI.* Electrical devices. *Necessary skills taught by operation of equipment.* How to show a motion picture, make a wire recording, tune and calibrate frequency on a communication receiver. *Suggested projects:* Wire a fluorescent lamp (not the construction of a lamp), wire a radio control alarm, wire a photo cell alarm, wire a capacity relay, wire a two- or three-stage radio, and wire a phono oscillator.

Examination of this course shows that beginning projects are short and do not require many skills, later units necessitate more time on the projects and require a more complete understanding of circuits. Construction is de-emphasized and assembly and circuits become more important. In this way it is electricity for industrial arts.

# Bonding Brake Lining

## *A new development for the auto shop*

### *By H. B. Barrett*

**The up-to-date auto-shop teacher keeps abreast of the newer developments in automobile servicing. Here is a description of a new process and how the shop teacher can incorporate it in his instructional program.**

A NEW development in the automotive field which should be followed with interest by teachers of auto shop is the bonding of brake lining to brake shoes. This new process replaces the traditional riveting of brake lining to shoes.

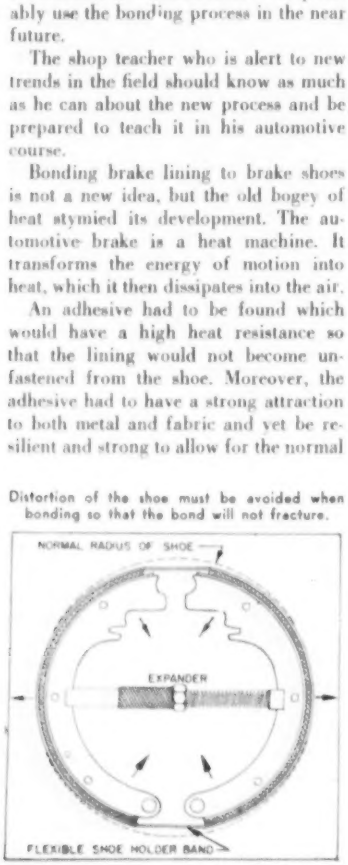
Chrysler and Chevrolet cars and trucks have used bonded shoes in production since 1949. It is reported that Buick Roadmaster for 1951 will be bonded, as will a considerable percentage of 1951 Cadillacs. Increasingly larger numbers of automobile manufacturers will probably use the bonding process in the near future.

The shop teacher who is alert to new trends in the field should know as much as he can about the new process and be prepared to teach it in his automotive course.

Bonding brake lining to brake shoes is not a new idea, but the old bogey of heat stymied its development. The automotive brake is a heat machine. It transforms the energy of motion into heat, which it then dissipates into the air.

An adhesive had to be found which would have a high heat resistance so that the lining would not become unfastened from the shoe. Moreover, the adhesive had to have a strong attraction to both metal and fabric and yet be resilient and strong to allow for the normal flexing of brake shoes during application of pressure.

Distortion of the shoe must be avoided when bonding so that the bond will not fracture.




Synthetic resin was found to fill the bill partially. When heated to 375° to 425° it undergoes a chemical change and hardens, effecting a bond. After the original setting, it requires from 700° to 800° to soften and even then it retains a great degree of tenacity until completely carbonized by higher temperatures.

Unfortunately this type of thermal setting material has the unhappy property of becoming brittle after it has set. While tremendously strong, it is easily shocked and broken apart. This led to early failures among bonding experimenters.

Recently, however, synthetic rubber and other materials have been successfully blended with the synthetic resin without impairing its thermal setting qualities. They give the bonding material resiliency and added strength. In fact, a bonded shoe with this type of material is considerably stronger in a shear test than a riveted shoe.

Now let's look at the reasons why a bonded shoe is superior to a riveted shoe on other scores:

1. It will wear up to 50 percent longer.
2. It is far less apt to cause squeals and brake noise.
3. It is less apt to score drums.
4. The cost is about the same.
5. Less time is required to deline and rebond with recently developed equipment.

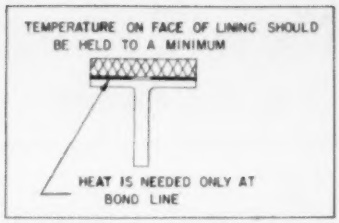
Incidentally, any of the known brands of brake lining on the market can be safely bonded.

The shop teacher who wishes to add this important new development to his automotive course of study will need to secure bonding materials and equipment for performing the operation.

Safe bonding materials which are easy to use are now available in tape and liquid form. An activator or priming agent is also available for reactivating over-age bonding material and for priming surfaces to be bonded.

Tape bonding material is offered in 100′ rolls, 5/8″-wide. Two strips of this material are placed near the outer edge of the shoe to be bonded as can be seen in the accompanying illustration. A space is left in the center for escaping gases. Additional strips may be added for bonding wide shoes.

Liquid material is essentially the same as the tape, but is applied to lining and shoe and is allowed to dry for a few minutes before bonding.




Cross-section view of shoe showing tape between band and surface of shoe with air space between.

Reactivator is a water-thin material possessing the qualities of liquid bonding material and is used for revitalizing over-age material and for priming surfaces to be bonded, as mentioned above.

Some manufacturers furnish precoated lining with bonding material applied to the back of the lining ready to use.

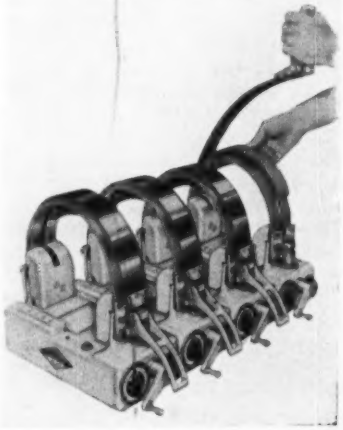
The equipment necessary for doing a safe bonding job includes a bonding unit, a bond tester, a sander to grind the face of the shoe, and a bonded lining remover. One manufacturer offers a combination unit which bonds lining on brake shoes at low heat and removes worn bonded lining from shoes through the application of super heat. This unit is of the anvil type which applies heat direct to the under side of the shoe. It is adjustable to various diameters of passenger car and light truck shoes.

Other types of bonding equipment include units with fixed anvils of given diameter, ovens using convection heat, and ovens using infra-red heat.

Certain cautions should be observed in the bonding operation:

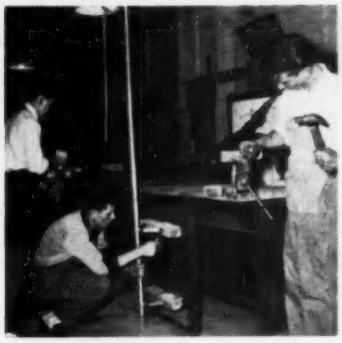
(*Continued on page* 32)

A bonding unit which can be used for removing old bonding, thus eliminating an extra unit.



# TV Instruction Should Emphasize Installation

*By Samuel L. Marshall*



TV installation operations in a school shop. At the right a student is shown drilling a hole in a brick, using a hammer and masonry drill while at the extreme left another student is performing the same operation using a slow-speed electric drill with a carbide-tipped drill. In the center a student is mounting a mast to bricks fastened to an angle-iron rack.

**This phase of the trade TV curriculum has been neglected in many schools when it should be given emphasis because of industry's needs. Samuel L. Marshall teaches television at the George Westinghouse Vocational High School, New York City, and is editor of "Radio Service Dealer" magazine and the author of the book, "TV Installation Techniques."**

AS television forges ahead, rapidly becoming a billion-dollar industry, many thousands of young men are being trained to become installation and receiver repair mechanics. An estimated 150,000 will ultimately be needed to meet the nation's needs. A recent news release by the Veterans Administration stated that more than 60,000 veterans have received, or are in the process of receiving, training in radio and television under the G.I. Bill of Rights. Add to this the thousands of other young men being trained in public and private trade schools, and some idea will be had of the tremendous number of individuals receiving this type of training.

However, a rude shock usually awaits these trainees when they graduate and go out to look for jobs. In spite of the critical shortage of trained TV receiver repair technicians, seldom is a graduate hired in this capacity on leaving school. On the other hand, the industry seems willing to hire graduates as installers, provided they have been trained in the appropriate operations. The reason for this is that a technician must necessarily have a good many years of practical experience before a firm will trust him with the repair of a customer's TV receiver. No school, of course, can provide this experience. On the other hand, students can be trained to perform a workmanlike installation provided they have had adequate school training along these lines.

How adequate is the training given in antenna installations? It has been found that in practically all of the school courses coming under our observation too little stress is placed on installation technics. This can perhaps be attributed to the vast amount of material that must be covered which pertains to the TV receiver itself. However, it is unfortunate that TV installations should be treated as something to be merely "touched upon."

This concept of the relative unimportance of quality in antenna installations apparently has been carried over by those who were accustomed to radio antennas of yesteryear which were merely wires strung haphazardly on rooftops with little regard to strength and safety.

For many reasons this type of work in TV is no longer acceptable. First, a receiver will not operate properly without sufficient signal input, which most often requires an efficient outside antenna. Second, a TV antenna, as a substantial hunk of metal, constitutes a potential menace to life and property if it is precariously perched on a rooftop. Third, the owner, installer, and landlord are usually fully cognizant of the fact that any damage sustained as the result of a falling antenna leaves them individually or collectively open to a suit for damages. Fourth, a growing movement on the part of municipalities to protect its firemen, and the public consciousness of safety, is making it mandatory on the part of the installer to abide by rigid safety codes. Finally, the installer himself is becoming conscious of the mounting toll of TV installation accidents and the need for a workmanlike and safe installation.

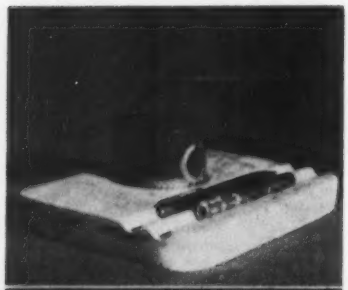
Just "touching upon it" is not enough to cover the vast array of knowledges and skills an installer must possess to perform a workmanlike TV installation. For example, he must have a knowledge of various types of antennas to meet different problems of reception. He must know how to eliminate various types of interference. He must possess the ability to construct substantial supporting structures on buildings of all kinds; he must be able to work on all types of building materials, such as brick, concrete, steel, etc. He must be able to construct high masts and towers capable of withstanding wind and ice loadings usually encountered. He must have a knowledge of the standard safety practices and code regulations. These being only a few of the many skills and knowledges pertaining to TV installations, it would seem that it certainly merits more than just casual treatment in the curriculum.

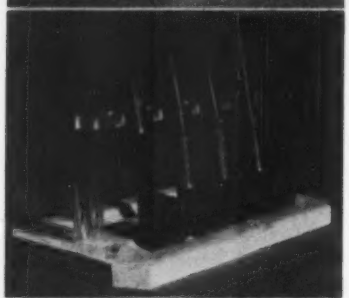
Let us return again to the effect of the policy of deemphasizing installation technics on the student on graduation. It is a fact that many students cannot keep up with advanced TV receiver repair training and drop out before completing the course; or, having completed the course, cannot find employment because their training in installation technics has been inadequate. Yet these students might have found jobs in the TV industry as installation men if only they had been given adequate training of this type—training which involves more mechanical than mental aptitudes.

The various TV training schools throughout the country must take cognizance of this situation and alter their courses of study if they are to meet their responsibilities as vocational institutions. The ultimate test of the validity of any proposed course in a vocational school is the manner in which it meets basic vocational objectives. If these are to be met, a school must help the student choose, train for, enter on, and make progress in a given trade. It is not enough that a school help a student choose, or even train for, a given trade, it must also help him enter on and make progress in this trade.

In view of the above considerations, and in view of the fact that most of our future TV technicians will find jobs in television only as installers at first, it is suggested that sufficient time be allotted in the overall TV course to installation practices and theory. For that matter, a separate course in TV installation technics might well be considered. This should follow a basic course in radio which would be a prerequisite to the conventional course in TV receiver theory and repairs.

# Marbleized Projects Are Really "Keene"





All these projects have that attractive marbleized effect. The author describes below the use of limeproof plaster pigment in bringing this about. All photographs were taken by Don Thiel, also a student at Trenton State Teachers College.

## By Charles J. Varga

**Here is a unique project which carries plenty of instructional value. Wood-form projects in casting using Keene cement have not been developed as well as they should by teachers. These were worked out for a demonstration school at the Trenton, N. J., State Teachers College where Charles J. Varga is a student.**

MANY teachers have projects which call for use of Keene cement. The ones I have outlined below are somewhat different from the rest as they call for the construction of wood molds for casting the cement. These projects resemble marble and when highly polished are quite attractive. The marble effect is created by mixing a limeproof plaster color to the white Keene cement. A black pigment is most effective although various color combinations can be used with good results.

The wood molds are fastened together in such a way that they can be taken apart, thus making removal of the Keene cement casting easier. The molds are given a few coats of enamel paint to reduce the tendency of the cement to stick to the wood, and also to protect the mold from moisture. Applying a thin coat of vaseline to the form will cut down on sticking, also. These molds can be used many times over. In constructing the molds, consideration of draught has been cut down due to being able to take the molds apart. However, in certain cases it has to be considered.

A large mixing bowl, mixing spoon, a knife, some water, and the limeproof plaster colors are needed to mix the cement. About ten pounds of Keene cement should suffice for the three projects. Pour it into the mixing bowl. Slowly add water, mixing steadily until a thick, smooth, pasty mixture is obtained. Now the pigment is added. Dip the knife tip into the limeproof plaster color pigment and gently tap the knife to sprinkle pigment evenly over the cement. Not more than half a teaspoonful of pigment should be used for best results. The pigment is cut into the Keene cement. Using the knife, make cutting strokes back and forth in all directions to work the pigment in. It is better if the mixture is under-mixed than over-mixed, because as the cement is transferred from the bowl to the mold a further mixing takes place. A wooden spoon can be used to put the cement in the mold, or the cement can be poured into the mold from the mixing bowl.

Air bubbles are formed from the mixing operation. To remove these bubbles, the poured form is tapped smartly to the bench. This should be done for two to three minutes to insure removal of all bubbles.

Approximately 24 hours after the mold is poured, it is safe to remove the casting. At this time the cement is still fairly soft and a certain amount of care is needed to keep from cracking or chipping the casting while removing it from the mold. Any drilling in the cement should be done immediately after removal.

The casting should then be left to harden or cure for at least six days. To rub down the cement, sandpaper is used, starting first with a rough, and working down to a fine paper. Five or six coats of wax will give the project a shiny finish and protect it.

### Desk Set

*Bill of Materials*

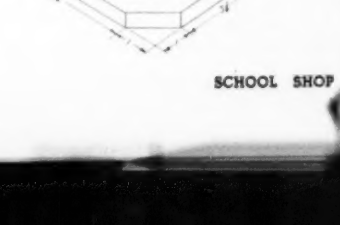
| *Wood mold* | *No.* | *Dimensions* |
|---|---|---|
| Bottom | 1 | ¾" x 5½" x 10" |
| End | 2 | ¾" x 2" x 5½" |
| Side | 2 | ¾" x 1½" x 10" |
| ½" dowel | 2 halves | ½" x 8" |
| Inkwell block | 1 | to fit bottle |

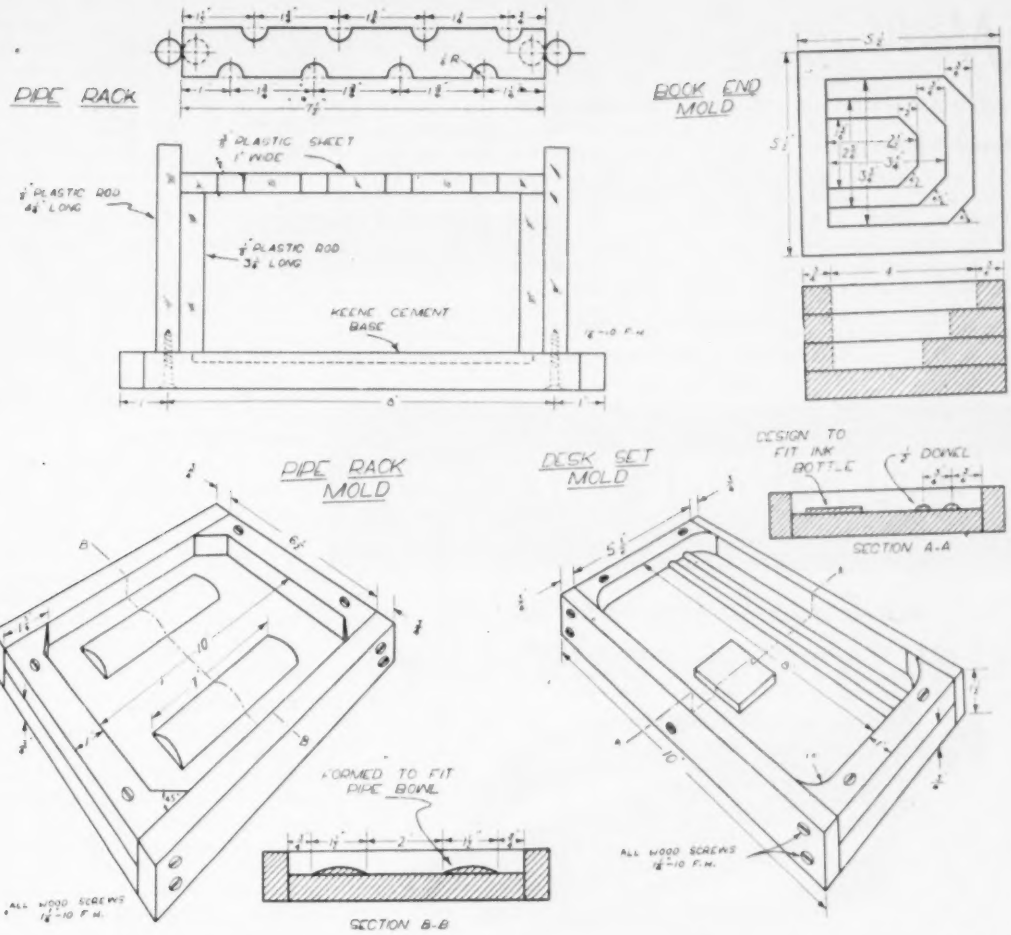
Any kind of wood can be used. On removing the casting from the mold, the side pieces are unscrewed first, then the end pieces. A slight drag is encountered in removing the cast from the bottom due to the inkwell block (it should have a slight draught) and groove blocks. Turning the casting over, the inkwell block and groove blocks are gently tapped to loosen, then screws are inserted into the wood, and they are pulled free.

### Pipe Rack

*Bill of Materials*

| *Wood mold* | *No.* | *Dimensions* |
|---|---|---|
| Bottom | 1 | ¾" x 6½" x 12" |
| End | 2 | ¾" x 1⅝" x 6½" |
| Side | 2 | ¾" x 1½" x 12" |
| Pipe bowl blocks | 2 | ¼" x 1½" x 7" |
| *Plastic* | | |
| Post | 2 | ½" rod, 4½" long |
| Support | 2 | ½" rod, 3½" long |
| Notched piperest | 1 | ⅜" x 1" x 7½" sheet |






Two 3/16" holes are drilled in the casting after removal from the mold, 8" apart as shown above. Holes are countersunk for the head of the screws.

After hardening and waxing a 1/8" hole, 1/2" deep, is drilled in one end of the 4 1/2" long plastic rods, and they are fastened with 1 1/4"-10 F.H. screws to the Keene cement through the bottom of the base as shown above. The 3 1/2" plastic rod supports are cemented to the posts with ethylene dichloride. The horizontal pipe rest is cemented to the top of the supports, and the pipe rack is ready for use.

**Book Ends**

*Bill of Materials*

| *Mold* | *No.* | *Dimensions* |
|---|---|---|
| Wood layers | 4 | 3/4" x 5 1/2" x 5 1/2" |
| *Wood* | | |
| Backing | 1 | 3/4" x 6 1/4" x 5 1/4" Walnut |
| Base | 1 | 3/4" x 5 3/4" x 5 1/4" Walnut |
| Door | 1 | 1/2" x 3 3/8" x 1 3/4" Maple |

To remove this cast from the mold, it is turned upside down. A screwdriver is inserted between the top piece and the next layer, and the top piece is evenly pried up. Each layer is removed by prying upward evenly with a screwdriver.

After steps are removed from the mold, they are positioned on the walnut base and backing.

The door area, 3 3/4" x 1 3/4", is cut out of the backing, as shown in the drawing. The door of 1/2" maple is fitted into backing. The window, 1/2" x 3/4", is cut in the door. The back saw is used to give the effect of board joints on the door, and door hardware is cut from sheet-metal and fastened to the door with escutcheon pins. The door has a natural finish and the walnut is stained to give a contrast between the wood and Keene cement. It is then varnished. The steps are rubbed down and waxed, then refastened to the walnut base.

You will find that the book ends are quite sturdy and fairly heavy. A piece of felt can be cemented to the bottom of the base to prevent scratching.

**Following Directions!**

—*Aaron Adams, Marion, Ind., High School.*

# News

HAPPENINGS IN INDUSTRIAL EDUCATION

### Miami Get-Together

THE Grand Chapter of Iota Lambda Sigma will hold its annual business meeting and dinner at Miami, Florida, on Wednesday, November 29, at 5:30 P.M. This annual meeting is, of course, in connection with the AVA Convention. The fraternity's national advisory council will meet in Miami on Monday, November 27, at the Hotel McAllister at 4 P.M., according to an announcement received by SCHOOL SHOP from Clyde H. Wilson, Secretary - Treasurer of the Grand Chapter.

### Woodshop Gift

MARIETTA, Ohio, College now has a complete woodworking shop, thanks to the generosity of its ex-president, Draper T. Schoonover. A hobbyist in wood for 46 years, Dr. Schoonover retired from his Marietta office in 1945. He has been active in woodworking in spite of his 78 years until recently.

The shop will be set up in a campus building as a craft center for student and faculty use, college officials said, adding that it will bear the name of its donor. There are nine power woodworking machines, a metal-turning lathe, storage cabinets, hand tools, and a supply of fine woods in the shop.

### OVA

THE third annual meeting of the Ohio Vocational Association held in Columbus, September 29 and 30, had as its theme "Better Citizenship—Whose Responsibility?" A Life Membership certificate was presented to Dr. Joseph Strobel, retiring State Director of Vocational Education, at the annual meeting.

Dr. Strobel also acted as moderator at the Trade and Industrial Education Section meeting, the theme of which was "More Than Just Manipulative Skills."

### New T & I Group

OREGON became the latest state to form a Trade and Industrial section in its vocational association last summer. The section was set up at the annual trade and industrial summer conference at Newport. The president of the new wing of the OVA is Ray J. Haas, Forest Grove. Vice-president is Wilson Bilyeu of Bend. A committee was appointed to draft a constitution for the section.

### NYU in the News

NEW YORK University, New York City, announces the additions of the following courses to its Department of Vocational Education in the School of Education: (*a*) The Industrial-Arts Teacher in the School Program, an outline of school administration and the part of the industrial-arts teacher in the democratic school; (*b*) Project Design I and II, an experimental and analytical approach to the problems of design; (*c*) Graphic-Arts Craft I and II, initiatory courses in the nature and practice of pictorial reproductions and other phases of graphic arts.

Also at NYU, announcement has been made of the dates for the annual Spring Conference of the Department of Vocational Education. The meetings will be held on April 20 and 21.

### KVA

FEATURED speaker at the annual luncheon of the Kansas Vocational Association in Topeka, November 3, was M. D. Mobley, Georgia State Director of Vocational Education and soon to succeed L. H. Dennis as executive secretary of the American Vocational Association. Dr. Mobley also spoke at morning and afternoon sessions of the Kansas Industrial Education Association as did Merton C. Wheeler, State Supervisor for Trade and Industrial Education in Missouri.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## *IN THE Morning Mail . .*

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Dear Mr. Diamond:

I have just read your most interesting editorial on page 2 of the October issue of SCHOOL SHOP entitled, "A Holiday on Objectives," and I write to tell you that I think this is an excellent and timely article.

I have often wondered about the very things you describe here. We have been guilty too often of setting up high-sounding objectives and apparently assuming that their realization would be forthcoming. I am sure you must have read E. E. Erickson's illustrated story of "Jimmy Dugan and the Bull's-Eye on the Ball Park Fence."

Your article has caused me to list this problem of the evaluation of outcomes near the head of my list of research problems and I can assure you that in the near future I will get one or more doctor's degree candidates to digging in on it.

More power to you for other thought-provoking editorials.

*H. H. London,*
Professor of Industrial Education,
University of Missouri,
Columbia, Mo.

Gentlemen:

Much has been written and said about the use of safety zones around hazardous equipment in the school shop. The most recent reference to this practice that has come to my attention appeared in the October (1950) issue of SCHOOL SHOP.

Failure to mark safety zones around hazardous equipment was listed as one of fifteen contributing causes of school shop accidents. Other authors have advocated the use of the safety zone.

Safety lines painted on the floor around machines and in dangerous zones have been used for some time in industry. The lanes and zones established by these lines are intended to restrict passage to within these established lanes and to prohibit entrance into the zones around machines by anyone but the operator. A variation of this system is the erection of barriers or fences around danger zones.

Advocates of the system claim that such zones prevent other students from distracting the attention of the machine operator from his work.

Critics of the system say that the line does not prohibit another student from standing outside the line and talking to the operator. They also claim that the line is based on an unsound educational premise; that the need for such a line indicates a weakness in instruction. They believe that students should be taught to respect the safety of others and that the development of proper attitudes in this instance is a necessary part of teacher responsibility.

My intent is neither to support nor condemn safety zones. Safety zones, properly used, can, and probably will, reinforce the instruction program. They can also be one of many factors which contribute to a general disregard for established procedures.

The purpose of this letter is to encourage considered opinions before adopting suggested practices which look good in print. Beginning teachers, and especially the prospective teachers in our colleges, should understand both the strengths and weaknesses of safety zones. The same may be said for a number of current instruction procedures used in the name of safety.

Of utmost importance, if zones are established by lines, the purpose of those zones should be clearly known by all students and enforcement should be absolute. The teacher must never assume that the establishment of such zones takes the place of instruction.

As yet, there is no evidence to show that safety zones effectively reduce school shop accidents.

It has become a general practice to adopt industrial safety practices in the school shop just because those practices have been effective in industry. It is time for us to examine each of those practices in terms of their effectiveness in the school shop.

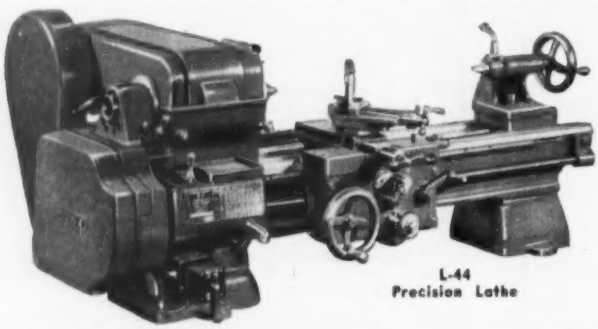
Perhaps this will encourage some graduate student to make a realistic study of the use of safety zones in the school shop. I hope it will.

*Wayne P. Hughes,* Director,
School and College Division,
National Safety Council,
Chicago, Ill.

Gentlemen:

Some time ago I acquired a friend in Holland via ham radio. It was more than the usual casual contact, ending with an exchange of acknowledgment cards, as we now correspond regularly with each other, exchanging radio ideas, pieces of equipment, etc. In the course of time, it developed that Peter is an employee of the Associated Press, and he learned that I am a vocational school director. Hence it was with mixed amusement and consternation that I read the article in September SCHOOL SHOP entitled "Dutch Vocational Education" as I had re-

(*Continued on page* 39)

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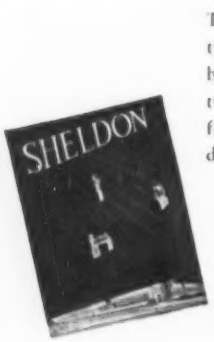


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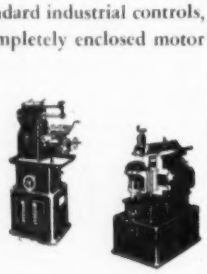

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Thank you Mr. Hope. You are kind, very kind. Ladies and gentlemen, this isn't a song. It's just a suggestion. This year, let's *all* give U. S. Savings Bonds for Christmas presents. Tell 'em about those bonds, Chisel Nose.

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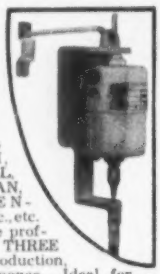

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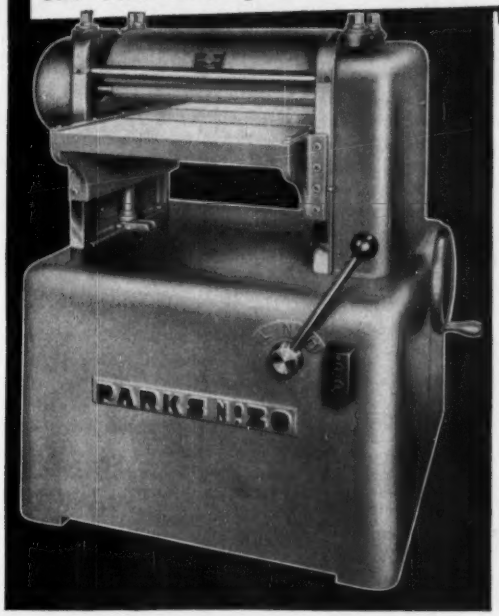
—*Aaron Adams, Marion, Ind., High School.*

## Strictly Personal

ABOUT YOUR FELLOW TEACHERS

BERRY E. MORTON of the Missouri State Department of Education has been named to the faculty of Indiana State Teachers College, Terre Haute, department of industrial arts and trades and industry. . . . New members of the faculty of The Stout Institute, Menomonie, Wis., are EDWIN SIEFERT, assistant professor of machine drawing; ROBERT SWANSON, instructor in industrial arts; and ROBERT W. BLAESING, instructor in printing. . . . WALDO BERRY, former auto-mechanics teacher at the Fond du Lac, Wis., School of Vocational and Adult Education, is now director of the Tomahawk, Wis., School of Vocational and Adult Education. . . . FRED W. SWAN, Illinois State Board for Vocational Education, has been named coordinator, Technical Building, Evanston, Ill., Township High School. . . . EDWIN B. BROWN has been named associate education supervisor in the New York State Education Department, Albany, to work in the field of vocational arts and crafts. He was formerly at the Saranac Lake, N.Y., Study and Craft Guild. . . . MARCEL A. WITTEVRONGEL, former supervisor and machine-shop instructor at East Moline, Ill., has been appointed to the staff of the trade and industrial education division of the Illinois State Department of Vocational Education.

The Sensationally NEW Low-Priced

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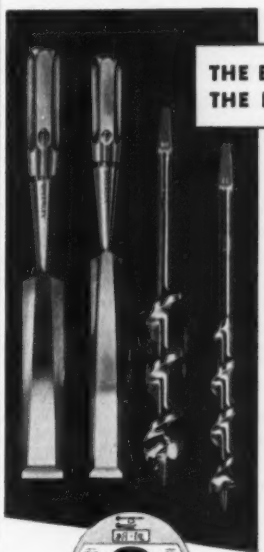

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**Greenlee Chisels, Gouges, and Auger Bits** help students get the feel of true craftsmanship easier and faster. For they are tools of highest quality to assure clean, accurate results. New GREENLEE Chisels with Hard-Wear Handles, illustrated, have long-lasting blades with fine-cutting edges. And the handsome new transparent handles are tough, weather resistant, safe. GREENLEE 22 Solid Center Auger Bits are induction heat treated for true uniformity to assure sharp cutting edges, smooth, easy action for clean boring. And each GREENLEE 22 is "Plastic-Sealed" to reach your shop in perfect condition. Get GREENLEE for top quality.

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# School Shop KINKS

Payment will be made for each Kink published. Send to Editor, School Shop, Ann Arbor, Mich.

### Connection Kink

One method which I have found useful in electricity laboratory is the following:

Give each work desk a number which can correspond to a numbered hook on the lab wall. Place six insulated wires about 18 inches long on each hook. Attach alligator clips to the wires. Announce to the class that each student is responsible for the wires on the hook which belongs to his desk and must replace them on the hook at the end of the period. A notice on the bulletin board can serve as a constant reminder that wires must be maintained by each student. When a wire becomes worn or frayed, or a clip gets broken, instruct the students to ask the teacher for a new part. They can then attach the new wire or clip. They soon come to realize that proper care of connecting wires makes it possible for them to make their connections quickly and safely. You will find that less wires have to be replaced when students are put on their own in maintenance and repair and that loss of binding-post tops is eliminated when you remove all posts in order to use clips.—*Samuel D. Levinson, Far Rockaway, N.Y., High School.*

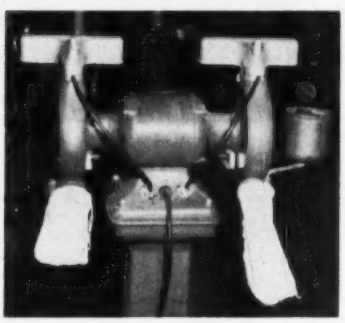
### Protection Kink

Wrap a few wide rubber bands or a strip from a discarded inner tube around the sides of the whetstone or its containing box. This permits the stone to be firmly held in the vise without danger of chipping or breaking when dressing tools or parts.—*Harry J. Miller, Gillespie Junior High School, Philadelphia, Pa.*

### Dust Collection Kink

Here is an idea which works very well, is inexpensive, and, I believe, will be of use in many, many shops:

The grit and metal grindings resulting from the use of a grinder are highly undesirable when scattered around any shop. Many grinders are so constructed that a dust filter may be attached. Not having purchased such a commercial dust filter, I have found that cloth bags attached as shown in the photograph



serve as excellent dust collectors. The cleanliness of the shop floor is a good testimony to the effectiveness of the bags in catching dust.—*Ira H. Johnson, Minnesota State Teachers College, Mankato.*

### Display Kink

This device is handy for holding blueprints, drawings, or instruction sheets at eye level above various machines in the shop.

Take the metal ring assembly from a three-ring binder or note book. Remove the rivets and insert two ¾" #6 round-head wood screws. Fasten to the wall or other suitable place near the machine or work station.

Printed matter can be cemented or glued to presswood, cardboard, or other stiff material with three holes drilled to fit the rings. This procedure makes for easy replacement.—*Eugene L. Dyke, Modesto, Calif., High School.*


The Lowest Priced, Practical, Rapid Production SPINDLE SANDER-GRINDER

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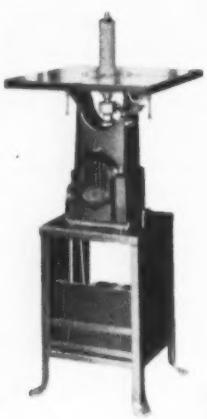

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Sands woods and does internal and external grinding of plastics, aluminum, masonite, brass, bronze, zinc and sheet metal up to six inches thick, straight and contours to as sharp a radius as 1/2".

Table, 20" x 20", tilts 45° two ways, by sensitive worm and rack fitted with accurate, quick-reading scale for beveling, drafting patterns and core-box work.

Handles 1", 1 1/2", 2" and 3" abrasive sleeves.

Drum, 9" long, (6" above table) oscillates with a 7/8-inch stroke, 83 times per minute at 2,500 r.p.m., sanding silky smooth with the coarse, faster cutting, longer-lived abrasives, a sure protection against scoring.

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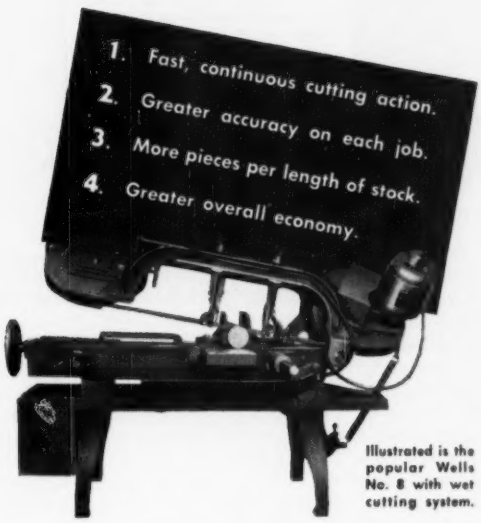
## *You benefit 4 ways with Wells Saws*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| Capacity in inches: Rounds<br>Rectangular | 3½<br>3½ x 6 | 5<br>5 x 10 | 8<br>8 x 16 | 12¾<br>12 x 16 |
| Blade speeds, ft. per min. | 54, 100, 190 | 60, 90, 130 | 60, 90, 130 | 50, 100, 150 |
| Motor Size | 1/6 H.P. | ½ H.P. | ½ H.P. | ¾ H.P. |
| Floor Space, in inches | 16½ x 38 | 21 x 50 | 24 x 72 | 32 x 78 |
| Wet cutting system | No | Yes | Yes | Yes |

Automatic stock projection available for Nos. 8 and 12.

Wells Saws

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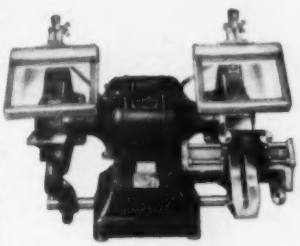
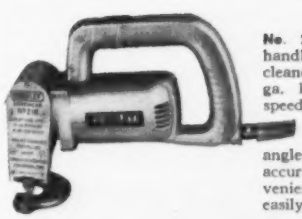


**NEW, LARGER EYE SHIELDS, No. 630 MOUNTED ON No. 610 GRINDER.** Stanley Eye Shields, Longtime favorite in schools, are also available in a larger size. Accommodate glass 10" x 6". Conveniently located toggle switch. Shields connected into grinder circuit so that light is on only when grinder is operating. For all Stanley Grinders and most other makes of motor grinders, bench or pedestal.



**No. 218 UNISHEAR.** Easier to handle than snips, faster and cleaner cutting. Cuts up to 18 ga. hot rolled mild steel at speeds up to 15 ft. a minute. Needs only guiding. Straight lines, curves, angles, notches with hairline accuracy. Duplex handle for convenience in any position. Blades easily replaced and re-sharpened.

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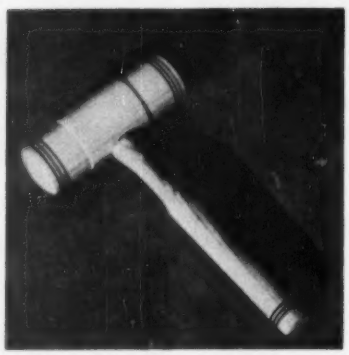
# Make Mallets from Old Bats

*By Frank L. Andrews*

**We don't know how Abner Doubleday would feel if he knew his favorite "tool" was seeing double duty as a doubleheader mallet, but here is a project which puts split baseball bats to good use. Frank Andrews teaches woodworking at Chino, California, Vocational High School (also known as the California Junior Republic).**



The circles on the head and handle are burnt in.

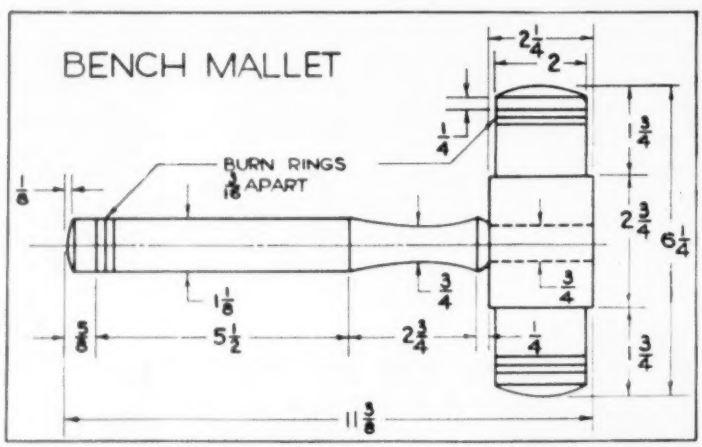
MOST of us in industrial arts at one time or another find ourselves facing the problem of improvising and of substituting materials because of lack of funds. Also, we find ourselves using this lesson of improvising as one of our objectives in the course of study, as we realize how important it is to be able to have the initiative to do so with skill and authenticity. For the student, there is no better lesson than: "Make what you have do the job."

A good example illustrating this is the making of the bench mallet pictured, a useful and worthwhile wood-turning project. This bench mallet is made from broken baseball bats procured from the baseball coach.

Constructing the bench mallet calls for all but a few of the fundamental processes of wood turning and affords the student an opportunity to make a project with utilitarian value as well as to gain a sound educational experience.

The wood used in the making of baseball bats, usually ash or hickory, has a very straight grain so care must be taken not to splinter the stock when using the turning tools. Sharp tools and a shearing, cutting action will give a smooth and easily-finished surface.

Turn the stock to required dimensions, after which sand lightly with machine in motion and with the grain with the machine at rest. Locate the position of rings and burn in using a 12-gage copper wire. Shellac both parts and French polish to a high gloss. Locate the hole for the handle, so that it runs perpendicularly to the annular rings. Then bore a pilot hole (use a bit about $\frac{1}{8}$" or less in diameter) halfway through the head, being very careful to bore perpendicularly. Bore only halfway through; start diametrically opposite to meet the first bore, making sure that the holes started are diametrically opposite. Select an auger bit equal in size to that of the handle of the bench mallet and bore from both sides following the pilot hole, at the same time correcting any errors which might have been made when boring the pilot hole. Saw off the excess material from each end, and smooth end surface with a sharp chisel and sand paper. Shellac and polish by hand. Assemble and glue.



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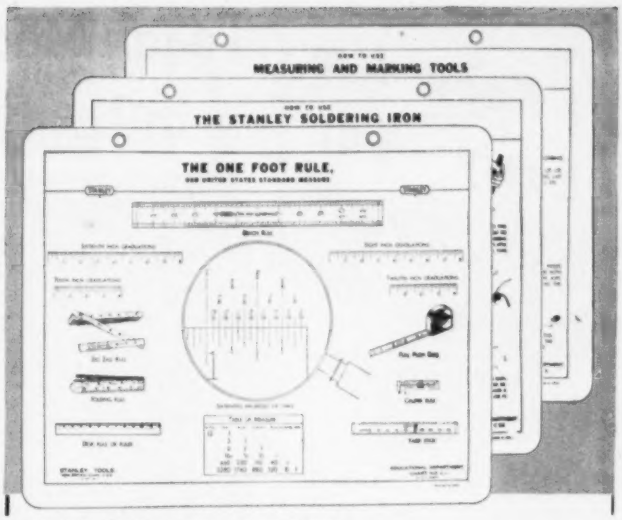


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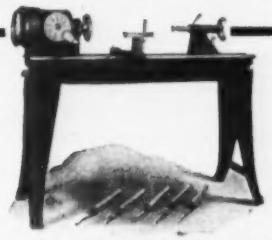
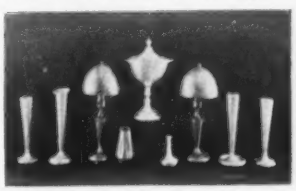
# "OLIVER" Metal Spinning Lathe



*Most useful Lathe in the shop*

. . . that's what several instructors who *know* the "Oliver" Spinning Lathe tell us. It is specially designed to spin aluminum, copper, pewter, etc., into attractive, useful articles. Spins 20-gauge steel with ease. Has ball bearing motor-driven headstock adjustable from 800 to 2750 RPM. Extra large bearings and bed. May also be arranged to turn wood.



***Write for Bulletin No. 159M***

**OLIVER MACHINERY COMPANY, GRAND RAPIDS 2, MICH.**

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And So Have YOU!

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2 Or how about a *GLASS ROD* — the *Tackle Sensation* that's a dream to use?

3 All made of the finest materials available and *built* in *Shop Class* at a fraction of their retail cost.

4 YOU CAN DO IT with a *Pioneer Project* available ONLY for *Student* use through the *Industrial Arts Instructors.* Ask your shop teacher to write for literature or a sample order for inspection.

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PIONEER PROJECTS
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PETOSKEY, MICH.

# Teach Machine Typesetting in High-School Shops?

*By Otto Reising*

**You are likely to find violent partisanship on the question of whether to purchase typesetting machines for high-school graphic-arts programs. Here is an explanation of why teachers and administrators who have tried classes in machine composition feel the way they do. Otto Reising is an instructor in printing and journalism at Horace Mann High School, Gary, Indiana, and has written for magazines and published a novel under a pseudonym.**

ADMINISTRATORS and teachers of graphic-arts programs are usually either 100 percent *for* or 100 percent *against* machine-typesetting instruction. Those who have abandoned the use of Linotype or Intertype machines after a trial say that it wasn't worth the expense and trouble. Those who swear by their machines say they wouldn't part with them. The explanation for these differing viewpoints is easy to find: successful programs have good machine composition instruction; those which abandon the use of machines have not had good instruction.

As it would cost a district around $10,000 in today's market to put in a new machine on which to teach composition, it is wise to consider the possibilities of establishing a sound and valuable program before going ahead with purchase. In the present writer's opinion, the prerequisites for a successful program of teaching with Lino- or Intertype machines are the following:

*1.* The instructor handling the machine should be a trained operator. By a trained operator is meant one who can hold a job in a commercial shop. Teachers in this category who have come from teacher-training institutions have invariably supplemented their schooling with work in the printing industry. Administrators should make every attempt to find men who fit this requirement, *i.e.*, men who can operate a machine and who are competent to pass on to students the "know-how" necessary in a good printer.

*2.* Care should be exercised in the selection of students for the machine-composition course.

It is possible to learn to operate a typesetting keyboard in a school shop, but it is not possible to learn all the myriad details one must know in order to keep a machine in good working order. To one who knows the machine, most troubles are minor ones. But someone lacking commercial shop experience can run into a lot of headaches when something goes wrong.

Selection of students for machine-composition courses should be based on a consideration of what their attitudes are likely to be toward printing as a creative, painstaking activity. Students who are overenthusiastic—who want to rush ahead to more complex operations after completing their first assignments—are not likely to have the patience to become first-class operators. For this is the virtue most needed in machine composition. The fast learner, so-called, is likely to exert little care in setting those first lines. And any operator will confirm that a line set wrong will give a machine more wear than will a month of regular operation.

Often the simple answer to the problem of how to teach for patience and painstaking care in composition is the dummy keyboard. This is an exact duplicate of the Lino- or Intertype keyboard. Practice on the dummy will help the student to learn the keyboard but it will teach him nothing about the operation of the machine. Its chief value lies in the fact that it may weed out pupils of little capacity or who lack the patience to learn to use the machine correctly and with care.

Operating the dummy keyboard is one of the most monotonous jobs a teacher can assign. Many students will give up in disgust after a few hours. But the one who has the patience to sit at the job for a number of hours, the one who cares for his machine and who doesn't make adjustments until he learns the proper procedure, is the one who will turn out to be a good operator, providing he has the other necessary attributes.

As most of us know, it is not necessarily those students with the highest IQ's who turn out to be the best tradesmen. One boy I know had to take sophomore English three times before he got his high-school diploma and is now making $105 a week as a Linotype operator only two years after finishing school. His English teacher said he might never have graduated if he had not learned his English while learning Linotype operation.

(*Continued on page* 32)

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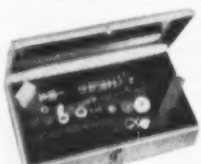

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## Brake Lining . . . . *from page 16*

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2. It is highly important that the equipment used for clamping the lining to shoes produce the required pressure for a good bond and follow-up pressure for expansion.

3. The shoe holder or shoe fixture used for supporting or applying pressure to the shoe during bond must be of a type which does not distort the shoe. Shoes forced out of shape during bonding return to their normal shape when pressure is released. This sets up a terrific strain on the bond which may fracture with a sudden shock.

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## Laboratory School *from page 10*

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Arizona Industrial-Arts Teachers and Supervisors, Phoenix, December 1-2.

Ohio Industrial Arts Association, Columbus, March 15-17.

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# *Instructional* RESOURCES

## *Books:*

**Measuring Educational Achievement.** Micheels and Karnes. New York: McGraw-Hill Book Co., Inc., 1950. Pp. vi+496. $4.50.

When industrial-education teachers write a book which is applicable in any teaching situation, that's news. It's especially good news for the industrial educator, though, for the suggestions and outlines for testing the effectiveness of teaching which this book contains have relevance for both industrial arts and for vocational training. The book is well illustrated and there are suggestions for further study and selected references at chapter ends.

William J. Micheels is in the Industrial Education Department, University of Minnesota, Minneapolis, and M. Ray Karnes is in the Industrial Education Department, University of Illinois, Urbana.

**Printing Types and How to Use Them.** Hlasta. Pittsburgh, Pa.: Carnegie Institute of Technology Press, 1950. Pp. vi+304. $7.50.

This is a rather comprehensive outline of the types in use in the graphic-arts industries. The introduction gives basic facts on type, recognition hints, and illustrations of representative faces. Sections two and three are devoted to book and magazine faces and to advertising and display faces respectively. The last section is an index of types.

Stanley Hlasta is Professor of Graphic Arts at the Carnegie Institute of Technology, Pittsburgh, Pa.

**Drafting Simplified.** Rotmans. Albany, N. Y.: Delmar Publishers, 1950. Pp. vii+408. $3.75.

A complete course in drafting is contained in this new book. It is set up so that junior or senior high schools as well as apprentice-training programs, beginning technical or engineering groups, or home students may use it.

The material is organized in complete learning units, each of which outlines objectives, introductory information, procedures, assignments, and review.

Elmer A. Rotmans is chairman of the Drafting Department at the Edison Technical and Industrial High School, Rochester, N. Y.

**Illustrating for Tomorrow's Production.** Farmer, Hoecker, and Vavrin. New York: The Macmillan Co., 1950. Pp. 203. $5.00.

Because all signs point to the fact that the world of tomorrow will differ markedly from that of today, the authors of this work have wisely aimed their teaching about illustration at what sort of illustration the student may be called on to produce tomorrow. The first part outlines production illustration in preliminary fashion. Section two details steps in making a production illustration; sections three and four give specifics on aircraft illustration and on advertising and industrial-design illustration respectively.

J. Harold Farmer, Abbott J. Hoecker, and Francis F. Vavrin all have been engaged in illustration work.

**Television and FM Receiver Servicing.** Kiver. New York: D. Von Nostrand Co., Inc., 1950. Pp. iv+248. $3.25.

The second edition of this work is one which brings TV and FM servicing up to date. The book has specific instructions for installing video sets and for finding what ails them when there is something wrong. Information for FM servicing proceeds from a basic knowledge of AM receivers and touches on all the important areas of FM servicing and operations.

Milton S. Kiver is Television Consultant for *Radio and Television News* magazine.

**Basic Mathematics for General Education.** Trimble, Bolser, and Wade. New York: Prentice-Hall, Inc., 1950. Pp. ix+313. $3.25.

Written in a kind of controversial tone, this text is aimed primarily, the authors say, at college freshmen who lack know-how to grapple with their college courses in social studies and natural sciences. As a general-education text in mathematics, it is also of use in technical schools, junior colleges, and in study at home, however. The emphasis is on ideas in connection with mathematics rather than on technics.

H. C. Trimble, F. C. Bolser, and T. L. Wade, Jr., are in the Mathematics Department at Florida State University, Tallahassee.

**Running a Regal.** Cincinnati, Ohio: R. K. LeBlond Machine Tool Co., 1950. Pp. 92. 50c.

This is the 14th edition of an important text on engine lathe operation and maintenance. This year an exploded-parts section has been added. Detailed instructions on how to perform 24 lathe operations are included. Also given are lubricating and maintaining instructions, plus some helpful chapters on lathe tools and how to grind them, and some tables used in lathe work. The cost of 50c is to help defray the cost of preparing the volume.

**Mobile Radio Handbook.** Sleeper (editor). Great Barrington, Mass.: Radio Communication (FM-TV) Magazine, 1950. Pp. 184. $2.00 paper. $4.00. Cloth.

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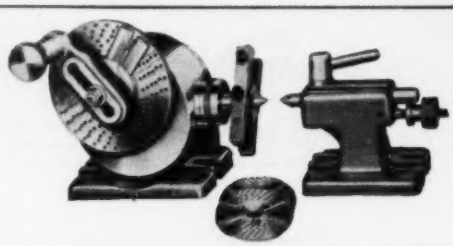

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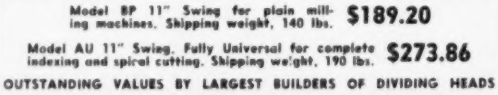

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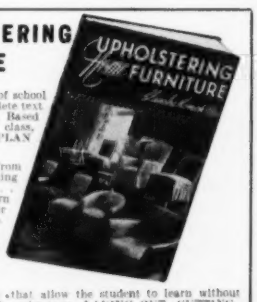


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communications, this also has a variety of advertisements and product listings from firms in the field. The first three chapters cover factors which must be considered when planning mobile or point-to-point systems. Three succeeding chapters are devoted to equipment selection, and others take up antennas, maintenance, costs, license requirements, and FM theory.

Milton B. Sleeper is the publisher of *Radio Communication (FM-TV)* Magazine.

**Annotated List of Technical Publications for Industrial Arts Education.** Menomonie, Wis.: The Stout Institute. Pp. iii+79. 50c.

Graduate students at Stout under the direction of Stuart Anderson compiled this bibliography during 1949-50. Criterions used in the selection of materials were: the recency of publication, judgment of experienced teachers, and recommendation by Stout faculty members. Copies may be obtained for 50c each by writing to the Graduate Office, Stout Institute, Menomonie, Wis.

## *Pamphlets:*

**Apprenticeship Past and Present** is a booklet subtitled *The Story of Apprentice Training in the Skilled Trades Since Colonial Days.* It has been prepared by the Bureau of Apprenticeship in the U. S. Department of Labor. Included in the booklet are examples of the system of indentures which preceded our modern apprenticeship system. The set-up in the U. S. today is outlined in detail. Copies of the booklet may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 15c.

**Fundamental Printers' Mathematics** is a booklet which has been assembled in its entirety by Charles D. Drury, a typographer and high-school teacher in Alexandria, Va. With illustrations and attractively-laid out text, the author takes up and explains points, measurement of type, manuscript estimation, etc., all of which are of importance in the teaching of graphic-arts subjects.

No price quotation is available, but Mr. Drury's address is 219 Weswood Drive, Alexandria, Va.

**Bibliography of Articles Concerning Conversion of War Surplus Equipment for Civilian and School Use** has been revised and brought up to date and is again available from the U. S. Office of Education, Washington 25, D. C. The bibliography was originally compiled by Willis C. Brown, Specialist for Aviation in the USOE's Division of Elementary and Secondary Schools. He is also responsible for the revision and would be pleased to hear from teachers and supervisors concerning conversions they have completed or which they have in mind.

## *Audio-Visuals:*

**An Index and Guide to Free Educational and Classroom Films from Industry** is a catalog prepared by the Modern Talking Picture Service. The films listed may be obtained from the Service or from branches of the Modern Film Library. Themes are chiefly those of industry, the "romance" of which forms a subplot in each story. Schools borrowing free films through the Service are asked to fill out a report on attendance, reception, etc., for the information of sponsoring firms. Write to Modern Talking Picture Service, 9 Rockefeller Plaza, New York 20, N.Y., for a copy.


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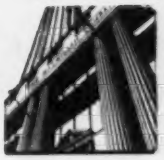

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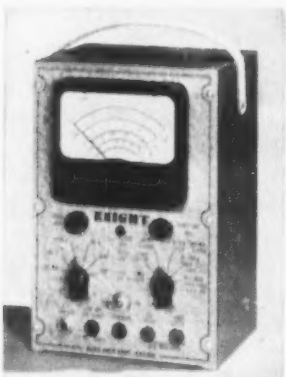
# News from INDUSTRY

## Knight VTVM Kit




Allied Radio Corp. of Chicago announces a new, low-cost Knight easy-to-build vacuum tube voltmeter kit, ideal for school classes. Designed for versatility, the new Knight VTVM includes 4 milliampere ranges and 6 capacity ranges—in addition to 20 standard VTVM ranges. It thus serves to teach students all constructional and operating details of a VTVM, and at the same time, the completed unit may be used in the lab for all testing applications requiring a VTVM or a VOM.

Complete, step-by-step instructions are furnished, including schematic and pictorial diagrams. For complete information write Allied Radio Corp., 833 W. Jackson Blvd., Chicago 7, Ill., mentioning SCHOOL SHOP; *or check No. 16 on the coupon.*

## New Stanley Instruction Charts

The Education Department of Stanley Tools, New Britain, Conn., offers a complete set of 38 new, extra-large instruction charts, 27½" x 20½". It has been almost ten years since these charts were available. Now they are enlarged and revised, and six new ones have been added. The new charts are printed on both sides of heavy, lacquered cardboard, 19 in all. They are profusely illustrated; wording is brief. They are designed to show details of tools and their correct uses. They are easily seen by a group of students, and, therefore, teaching is made clear and more effective.

The complete set is offered at the cost of printing and postage only. For complete details write the Education Department of Stanley, mentioning SCHOOL SHOP; *or check No. 17 on the coupon.*

## Snap-On Master Supreme Set

Snap-On Tools Corp., Kenosha, Wis., announces a new ½" square drive-socket wrench set with every unit redesigned to give greater working efficiency and stylized appearance. Known as the "Master Supreme Set," it consists of 15 double hexagon sockets ranging in size from 7/16" to 1¼", a 10" ratchet, 18" nut spinner, 15" sliding bar, 18¾" speeder, universal joint, and a 3½", 5" and 10" extension bars. For further information write the company, mentioning SCHOOL SHOP; *or check No. 18 on the coupon.*

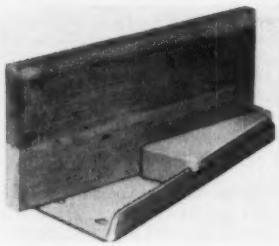
## New Handcraft Instruction Booklet

*Popular Projects*, recently published, has been especially written to aid group leaders in conducting craft projects. It describes in simple language how to make eight simple projects, each of which can be made in one class period. Well-illustrated instructions with drawings, pictures, and full-size patterns tell how to make things that all youngsters want to make. Available from Craft Service, 337 University Ave., Rochester 7, N. Y., at 25c per copy; *or check No. 19 on the coupon, and enclose 25c.*

## Safety in the Woodshop

As one step toward making this nation a safer place in which to live and work, Carnegie-Illinois Steel Corp., offers the *Safety in the Woodshop* program, including an instructor's guide, students' handbooks, and a 35mm filmstrip, free of charge to schools desiring to use the program. The required number of copies may be obtained by addressing requests to Mr. E. E. Moore, Vice-President, Industrial Relations, Carnegie Steel Corp., Pittsburgh 30, Pa., mentioning SCHOOL SHOP; *or by checking No. 20 on the coupon, and specifying number needed for your students.*

## Barron Bench Vise



A novel low-cost bench vise has been introduced by Barron Tool Co., Detroit 1, Mich., as a permanent or portable clamping device for use with woods, plastics, and metals. It holds any piece, paper-thin up to 3" wide, in a firm rigid position. It is highly suitable for planing long work pieces, sawing, drilling, sanding, filing, etc. For complete information write company, mentioning SCHOOL SHOP; *or check no. 21 on the coupon.*

## "The Flexible Shop"

A new concept in school-shop planning and power-tool use, the flexible shop, is examined by the authors, David D. Girard and Frank L. Vail, in relation to the woodworking area of industrial arts. Basis of the idea is the use of multi-purpose equipment to relieve common shop problems and open the way for new teaching technics. Among the subjects covered are teaching technic, machine changeover, tool and equipment storage, cost analysis, shop layout, and special problems of small schools. For free copy, write Magna Engineering Corp., 417 Montgomery St., San Francisco 4, Calif., mentioning SCHOOL SHOP; *or check no. 22 on the coupon.*

# New Literature

**Pottery Arts.** The Pottery Arts Div., Pemco Corp., announced recently the completion of their new catalog No. 249 on new designs, technics, products, and equipment for making pottery. The 64-page booklet is profusely illustrated, contains a complete ceramic glossary, a section on temperature equivalents, and other charts useful to both professional and beginner in making pottery.

For a copy, send 25c to Dept. NR, Pottery Arts Supply Div., Pemco Corp., 2554 Greenmount Ave., Baltimore 18, Md., mentioning SCHOOL SHOP; *or check no. 23 on the coupon, and include 25c.*

**Light Duty Drill Presses.** A new brochure on the Boice-Crane Series 1600 light-duty drill presses, which includes 12 models in one-, two-, three- and four-spindle units, bench and floor types, may be obtained from Boice-Crane Co., 938 Central Ave., Toledo 6, Ohio; *or by checking no. 24 on the coupon.*

**EICO Test Equipment.** The 1950-51 EICO catalog, printed in 4 colors, contains comprehensive, detailed descriptions, specifications, illustrations, and specific applications of every kit and instrument in the complete EICO line—a compact storehouse of helpful information for the radio-television teacher. For a free copy write to Electronic Instrument Co., Inc., 276 Newport St., Brooklyn 12, N.Y., mentioning SCHOOL SHOP; *or check no. 25 on the coupon.*

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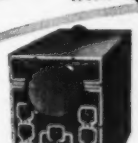

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## Washington . . . . *from page 40*

as peak employment was approached. In effect, to maintain a level of 100 workers at the average plant during the year, from 60 to 75 additional workers had to be recruited. Military inductions were responsible for about 10 percent of the separations, and the aircraft industry was given special consideration with respect to deferment. Lay-offs, deaths, and discharges took perhaps another 15 percent, while the remaining three-fourths were "quits."

Turnover rates were even higher in shipbuilding, ranging from 7 to 11 percent per month. In this industry, for every 100 workers employed in an average yard throughout the year, an additional 84 to 121 workers had to be hired. Military inductions caused 11 percent of this loss.

During the early expansion period of World War II, employment rose more rapidly than production. However, as the peak production levels were approached in 1943, the rate of production increase outdistanced that of employment. As workers attained greater efficiency through training and experience and as management problems were solved, employment tended to level off while production continued to climb. The existing emergency should find more workers with industrial skills, more recently built factories, and fewer material shortages, so that, while some gap is likely, the rise in production should follow more closely the rising employment curve.

**Increased Productivity Likely.**—Lifting productivity appears a major means of lowering manpower requirements. Technological know-how acquired in the last war should also help to raise the output quickly with fewer man-hours per unit than in the early years of World War II.

For purposes of planning how manpower requirements from the major claimants can be balanced, it is useful to know how great an expansion is planned for the armed forces and what the demands for equipment will be. Such in-

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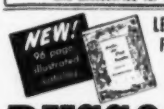


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formation is not available. However, a pattern of demand can be developed by applying the experience in World War II which can be changed to meet future indicated developments.

Peak manpower and production mobilization may not be needed in two years or four, or possibly not at all, but the greater the time available, the greater becomes the labor force potential of a rapidly growing population.

**Vocational Education's Responsibility.**—It is to the supplying of replacements, the training and education of skilled workers that the vocational schools must now turn to meet war demands.

Two national committees serving in an advisory capacity to the Office of Education on problems of vocational education discussed the role of vocational schools and classes in meeting the nation's defense and possible emergency needs. The conference was called by Commissioner of Education Earl James McGrath. It was attended by state directors of vocational education and chief state school officers holding membership on the vocational-education advisory committees.

Commissioner McGrath told the conference that the vocational schools in cooperation with the U. S. Office of Education directed the training of more than eleven and one-half million workers for war-production industry and to meet civilian needs of the armed forces in World War II. He said that since 1945, through federal, state, and local funds, training facilities in all branches of vocational education have been modernized and expanded, and that the facilities are on call for any emergency that may come in the days ahead.

**Skilled Personnel to Be Registered.**—Establishment of a National Scientific Register Project in the Office of Education with James C. O'Brien, National Security Resources Board member, as director has been announced by the Office of Education. Commissioner McGrath said that the NSRP will record and evaluate the competencies of the nation's specially trained and highly skilled personnel in important scientific fields. It will report on the character and distribution of the national supply of manpower for the various scientific fields and will consider steps which might be taken to increase the number of highly skilled areas. He said this is a service of obvious significance in the present international situation.

Vocational schools have a great responsibility in aiding in the solution of the problems resulting from the emergency. The schools in this will be assisting the National Security Resources Board in the Executive Offices of the President of the United States. The President is a member of the National Security Council made up of some members of the cabinet and acts as chairman of the Council. The National Security Council is the point where domestic and foreign policy come together, it is stated, the point where is established the basic security policies for the administration, whether in the domestic field or in foreign fields.

Thus the vocational schools will be tied in to a program of the greatest importance, the welfare of the nation.

**Mail . . . .** *Continued from page 22*

ceived a letter from Peter in the same mail. I quote a paragraph from his letter:

"Well Jess, can't understand what vocational school means. I think we have not those schools over here . . ."

I am sending him my September copy of SCHOOL SHOP, along with a dissertation of my own on the philosophy of vocational education as practiced in the United States in general, and Orlando, Florida, in particular.

You have a splendid magazine, and our entire faculty looks forward to receiving each issue.

*Jess R. Leach*, Director, (Radio W4AEP)
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WASHINGTON BUREAU

**Defense Training Step-up Planned.**—Vocational schools will step up their programs in the next two months in advance planning for service to the nation in training of workers for war-production industry and to meet civilian needs of the armed forces, the U.S. Office of Education has announced.

Training programs involving the use of vocational-education personnel and facilities now under way will be developed and will include all branches of vocational education. Training for industry, agriculture, homemaking, and business occupations will be expanded, and these facilities will be ready for any emergency that may come in the future.

Aircraft workers are now being trained in vocational schools which are giving specialized training to others as well in line with the needs resulting from threatening world developments.

The vocational-education advisory group has emphasized the need for training of replacements for those going into the armed services or other essential positions, including the training of foremen for industries, in addition to supplemental training to extend the skills of those now employed.

**Efficient Labor Distribution Desired.**—Distribution of the labor force and the efficient use of manpower resources of the nation will come up for close attention for training, education, civilian, and military employment in order to make the best use of skills where they are most needed. Information on this point from the Bureau of Employment Security of the U. S. Labor Department will be of considerable value, it has been pointed out. This bureau recently issued a report entitled, *The Labor Market and Employment Security* with a section on the "Manpower Potential for National Security."

In this report it is urged that the experience in World War II indicates the nature of the problems likely to be encountered in balancing competing demands with available labor supply. Considerable time was needed to build up the military ten years ago. Starting with 800,000 in 1940, four-and-a-half years were required to reach a peak of 12,300,000 in June, 1945. While a more rapid rate may be anticipated in another emergency, and while the present starting level is nearly twice that of 1940, the process still would be gradual.

The needs of the services cannot be measured simply in terms of net size, the Bureau states, since during the last war enlistments and inductions totaling 13,100,000 were required to achieve the increase to 11,500,000. Conceivably, replacement needs could be higher in the existing emergency.

The armed forces impose a steady though varying drain on manpower supplies, according to the Bureau, and such a large and continuing drain patently calls for a delicate balancing of the needs of the armed forces with the needs of war industry and the requirements of essential civilian industries. A consistent, realistically formulated deferment policy thus becomes a prime need in planning for the most efficient use of an exhaustible manpower supply, the Bureau urged.

**Metal-working Employment Down.**—In examining the claims made by industries directly and indirectly supporting the armed forces, a comparison of the current period with 1943, the year of peak war employment, is essential. In most major segments of the economy, in nonagricultural employment as a whole, and in such important industries as transportation and construction, there are now more workers than there were at the time when the war-employment peak was reached. Agricultural employment is now down to 9,000,000 workers. This is a continuation of a long-term trend resulting from increased mechanization, more effective use of soil and fertilizer, and other improvements.

In manufacturing, particularly in metalworking industries, employment is well below the wartime peak. The decline of 2,800,000, or 16 percent, in all manufacturing is concentrated in metal-working, the main war-production group of industries, which fell from 9,700,000 in June, 1943 to 6,300,000 in June, 1950.

Aircraft, shipbuilding, and ordnance are responsible for the postwar drop in metal-working employment, it is pointed out. Aircraft employment reached a peak of 2,200,000 workers in November, 1943. There were only 255,700 working in the industry in June, 1950, a decline of 88 percent.

Shipbuilding also reached its peak in November, 1943, with nearly 1,800,000 workers, but is now down to 138,000 workers, a drop of 92 percent. Employment in ordnance soared past 1,400,000 in July, 1943. Only 24,000 are now privately employed in the industry. Other metalworking industries have increased since World War II, rising by 600,000 to 5,000,000 workers, with primary metals accounting for a third of the increase.

**Turnover Is Big Problem.**—War industry has a major problem in replacement of turnover, as pointed out by the U. S. Office of Education, and it is the function of the Office and education leaders generally to make replacements available. For example, separations in aircraft plants during the World War II period ranged from 5 to 8 percent a month and were 6.5 percent in October, 1943

(*Continued on page 38*)

## INDEX TO ADVERTISERS

Acme School of Die Design Engineering....37
Allied Radio Corp....31
American Handicrafts Co....38
American Lead Pencil Co....28
American Technical Society....2
American Type Founders....cover 2
Atlas Press Co....6
Barrett Equipment Co....cover 4
Chas. A. Bennett Co., Inc....34
Boice-Crane Co....26, 38
Brodhead-Garrett Co....8
Canvas Products Corp....38, 39
Chicago Wheel & Mfg. Co....32
L. W. Chuck Co....34
Cincinnati Lathe & Tool Co....4
Cincinnati Tool Co....37
Columbian Vise & Mfg. Co....34
Craftsman Supply House....38
Craftsman Wood Service....31
Delta Power Tool Div., Rockwell Mfg. Co....5
Henry Disston & Sons, Inc....cover 3
William Dixon, Inc....31
DonJer Products Co....25
"Dowl-It" Co....38
Electronic Instrument Co....37
Ford Motor Co....5
Foredom Electric Co....24
Gearon Co....38
Greenlee Tool Co....25
Gyro Lamp & Shade Corp....38
B. Jadow, Inc....39
Lima Electric Motor Co....37
Macmillan Co....35
McKnight & McKnight....33
Metal Crafts Supply Co....38
North Bros. Mfg. Co....29
Oliver Machinery Co....29
Parks Woodworking Machine Co....25
Pioneer Projects....36
Plastic Products Co....38
Plastic Supply Co....39
Frederick Post Co....21
Russo Handicraft Supplies....38
John F. Rider Publisher, Inc....32
Howard W. Sams & Co., Inc....34
Sheldon Machine Co., Inc....22
Stanley Electric Tools....27
Stanley Tools....29
The L. S. Starrett Co....20
U-Mak-It Products....39
Universal General Corp....38
Universal Scientific Co....38
Walker-Turner Div....7
Weller Electric Corp....34
Wells Mfg. Corp....27
X-acto Crescent Products Co....32

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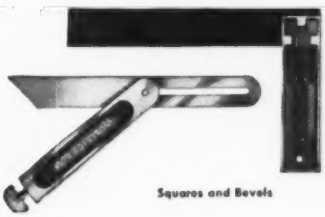

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